Is áis doiciméadúcháin amháin an téacs seo agus níl aon éifeacht dhlíthiúil aige. Ní ghabhann institiúidí an Aontais aon dliteanas orthu féin i leith inneachar an téacs. Is iad na leaganacha de na gníomhartha a foilsíodh in Iris Oifigiúil an Aontais Eorpaigh agus atá ar fáil ar an suíomh gréasáin EUR-Lex na leaganacha barántúla de na gníomhartha ábhartha, brollach an téacs san áireamh. Is féidir teacht ar na téacsanna oifigiúla sin ach na naisc atá leabaithe sa doiciméad seo a bhrú

►**B** **COMMISSION IMPLEMENTING REGULATION (EU) No 909/2013**

of 10 September 2013

on the technical specifications for the electronic chart display and information system for inland navigation (Inland ECDIS) referred to in Directive 2005/44/EC of the European Parliament and of the Council

(IO L 258, 28.9.2013, lch. 1)

Arna leasú le:

		Iris Oifigiúil		
		Uimh	Leathanach	Dáta
►**M1**	Commission Implementing Regulation (EU) 2018/1973 of 7 December 2018 (*)	L 324	1	19.12.2018

(*) Níor foilsíodh an gníomh seo i nGaeilge.

▼B

COMMISSION IMPLEMENTING REGULATION (EU) No 909/2013

of 10 September 2013

on the technical specifications for the electronic chart display and information system for inland navigation (Inland ECDIS) referred to in Directive 2005/44/EC of the European Parliament and of the Council

Article 1

The technical specifications for the electronic chart display and information system for inland navigation (Inland ECDIS) are defined in the Annex.

Article 2

This Regulation shall enter into force on the day following that of its publication in the *Official Journal of the European Union*.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

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ANNEX

ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM FOR INLAND NAVIGATION

(Inland ECDIS)

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SECTION 1

PERFORMANCE STANDARD FOR INLAND ECDIS

1. GENERAL PROVISIONS

(a) Electronic chart display and information system for inland navigation (Inland ECDIS) is composed of hardware, software for the operating system and application software.

(b) Inland ECDIS aims to contribute to the safety and efficiency of inland shipping.

(c) Inland ECDIS can be designed for both **information mode** and **navigation mode**, or for **information mode only**.

The minimum requirements for Inland ECDIS equipment designed for **information mode only**, specified in Chapter 4.1 of Section 1 and Section 4 of this Annex, are mandatory on waterways where carriage requirements are enacted by the responsible legislative organs. In other regions they are recommended.

(d) For **navigation mode** Inland ECDIS (Operating System Software, Application Software and Hardware) as specified in Section 4 of this Annex shall have a high level of reliability and availability; at least of the same level as other means of navigation.

(e) Inland ECDIS shall use chart information as specified by Sections 2 and 3 of this Annex.

(f) National authorities and international bodies are recommended to consider transitional provisions when they are introducing carriage requirements for Inland ECDIS.

(g) Inland ECDIS shall meet all the requirements of the Inland ECDIS performance standard set out in this Annex.

(h) The terms ‘skipper’ and ‘boat master’ used in this Annex shall be deemed to be equivalent with the term ‘ship master’ used in the RIS Guidelines – Commission Regulation (EC) No 414/2007 ([1]).

(i) The producer or supplier of Inland ECDIS software must document in the user manual of the software which requirements for equipment (hardware) referred to in point (c) need to be fulfilled for Inland ECDIS in information mode on waterways where carriage requirements are enacted by the responsible legislative organs.

(j) When the Inland ECDIS equipment provides essential services as defined in Directive (EU) 2016/1148 concerning measures for a high common level of security of network and information systems across the Union, the provisions of the said legislation apply.

(k) AIS is an automatic identification system for maritime vessels that complies with the technical and performance standards laid down in Chapter V of the SOLAS Convention (Safety of Life at Sea), as defined in the document referred to in point 2(r) of Section 1. Inland AIS refers

([1]) Commission Regulation (EC) No 414/2007 of 13 March 2007 concerning the technical guidelines for the planning, implementation and operational use of river information services (RIS) referred to in Article 5 of Directive 2005/44/EC of the European Parliament and of the Council on harmonised river information services (RIS) on inland waterways in the Community (OJ L 105, 23.4.2007, p. 1).

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to the automatic identification system for inland waterway vessels as set out in the document referred to in point 2(p) of Section 1. In this Annex, whenever AIS is mentioned it refers to both maritime AIS and Inland AIS, unless specified otherwise.

2. REFERENCES

(a) IHO Special Publication No S-57 ‘IHO Transfer Standard for Digital Hydrographic Data’, Edition 3.1, Supplement No 2, June 2009 with all Appendices and Annexes.

(b) IHO Special Publication No S-62 ‘ENC Producer Codes’, Edition 2.5, December 2009.

(c) IHO Special Publication No S-52 ‘Specifications for Chart Content and Display Aspects of ECDIS’, 6th Edition, March 2010, with all Appendices and Annexes, including:

— S-52 Appendix 1 ‘Guidance on Updating the Electronic Chart’, Edition 4.0, April 2012.

— Former S-52 Appendix 2 ‘Colours & Symbols Specifications’, Edition 4.3 (Jan 2008)

— Former S-52 Appendix 3 ‘Glossary of ECDIS-RELATED Terms Specifications’ (now S-32, Appendix 1 (Sep 2007))

— Annex A to former S-52, Appendix 2, ‘Presentation Library’, Edition 3.4 (2008)

(d) IMO Resolution MSC.232(82) ‘Revised Performance Standards for Electronic Chart Display and Information Systems (ECDIS)’, December 2006.— Appendix 3 NAVIGATIONAL ELEMENTS AND PARAMETERS

(e) IEC-Guideline 61174, edition 3.0 ‘ECDIS — Operational and performance requirements, methods of testing and required test results’, 2008-9.

(f) Annex 5, Sections I to III of the ES-TRIN 2017 standard: Requirements applicable to radar installations and rate-of-turn indicators.

(g) IHO Special Publication No S-32 Appendix 1 ‘Glossary of ECDIS-related Terms’.

(h) Edition 2.4 of Appendix 1 ‘Product Specification for Inland ENCs' of UNECE Resolution 48 ‘Recommendation on electronic chart display and information system for inland navigation (Inland ECDIS)’, including appendix 1.1 ‘IENC Feature Catalogue’ and 1.2 ‘Inland Electronic Navigational Chart Encoding Guide’.

(i) Edition 2.4 of Appendix 2 ‘Status of Presentation Library for Inland ECDIS' of UNECE Resolution 48 ‘Recommendation on electronic chart display and information system for inland navigation (Inland ECDIS)’.

(j) Edition 2.4 of Appendix 3 ‘Product Specification for bathymetric Inland ENCs' of UNECE Resolution 48 ‘Recommendation on electronic chart display and information system for inland navigation (Inland ECDIS)’, including appendix 3.1 ‘bathymetric IENC Feature catalogue, edition 1.0’.

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(k) EN 60945 (2002) + corr1 (2010): Marine navigational equipment; General requirements — Methods of testing and required test results.

(l) IEC 61162 is a collection of standards for 'Digital interfaces for navigational equipment within a ship'. The 61162 standards are developed in Working Group 6 (WG6) of Technical Committee 80 (TC80) of the IEC.

(m) IENC Domain in the S-100 Registry

(n) IEHG Product Specification for Inland ENCs

(o) IEHG Inland ENC Feature Catalogue

(p) Commission Regulation (EC) No 415/2007 concerning the technical specifications for vessel tracking and tracing systems (OJ L 105, 23.4.2007, p. 35).

(q) Annex II of Directive (EU) 2016/1629 of the European Parliament and of the Council of 14 September 2016 laying down technical requirements for inland waterway vessels (OJ L 252, 16.9.2016, p. 118).

(r) Directive 2002/59/EC establishing a Community vessel traffic monitoring and information system (OJ L 208, 5.8.2002, p. 10).

3. CONTENTS, PROVISION AND UPDATING OF CHART INFORMATION

3.1. **Contents and provision of Inland Electronic Navigational Charts (Inland ENCs) and bathymetric Inland ENCs**

(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 and bathymetric Inland ENC editions.

(c) At least the following features shall be included in the ENC:

— waterway axis with kilometres indication,

— links to the external xml-files with operation times of restricting structures, in particular locks and bridges.

— location of ports and transhipment sites,

— reference data for water level gauges relevant to navigation,

— bank of waterway (at mean water level),

— shoreline construction (e.g. groin, longitudinal control dam, training wall – any facility that is considered a hazard to navigation),

— contours of locks and dams,

— boundaries of the fairway/navigation channel (if defined),

— isolated dangers in the fairway/navigation channel under water,

— isolated dangers in the fairway/navigation channel above water level, such as bridges, overhead cables etc.,

— official aids-to-navigation (e.g. buoys, beacons, lights, notice marks),

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If the chart producer is using overlay files or bathymetric Inland ENCs, the features may be included in different chart cells, but the whole package must fulfil the minimum requirements listed in the indents above.

(d) Where the chart is intended to be used for **navigation mode** (Chapter 5.2 of this Section), the respective competent authority shall decide for each waterway or harbour which of the features referred to in point (c) are to be verified. After verification, the respective competent authority shall declare which Inland ENCs and bathymetric Inland ENCs are approved for **navigation mode** within its geographical area of responsibility (for details see Section 2A of this Annex).

(e) The System Electronic Navigational Chart (SENC) shall be stored in the Inland ECDIS.

3.2. **Updates**

(a) Inland ECDIS shall be capable of accepting updates to the Inland ENC data provided in conformity with the Product Specification for Inland ENCs and updates of the depth information provided in conformity with the Product Specification for bathymetric Inland ENCs. Those updates shall be applied to the SENC automatically. The implementation procedure of the update shall not interfere with the display in use.

(b) Inland ECDIS shall allow for the display of updates, so that the skipper 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) In navigation mode 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**.

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(c) In information mode ergonomic aspects shall determine the size. The information displayed must be readily visible from the conning position.

The display diagonal shall be equal to or larger than 199 mm (7,85 inches). Under all conditions the boat master must be capable of perceiving the displayed information sufficiently in accordance with Human Machine Interface guidelines.

If the software is sold without a display, the manufacturer's documentation shall include the information that it may only be used as Inland ECDIS in information mode if the display fulfils the requirements of this Chapter 4.1.

(d) The following criteria must be fulfilled in navigation mode as well as in information mode:

— Alphanumeric data and text shall be presented using a clearly legible non-italic sans-serif font.

— The font size shall be appropriate for the viewing distance from user positions (i.e. with respect to reading distance and viewing angles) likely to be experienced in the wheelhouse of a vessel.

— The character height and the size of AIS symbols in millimetres shall not be less than 3,5 times the nominal viewing distance in metres.

— The minimum size of AIS symbols and the minimum character height of AIS information shall be 3,5 mm.

— The manufacturer's documentation shall identify the nominal viewing distance for the display equipment.

(e) The display requirements shall be complied with, whether in landscape or in portrait format.

(f) In information mode for the size of the display it is recommended to use the size as specified for navigation mode. In the event that space for the installation of the display is a problem, the display size might be reduced taking into account the nominal viewing distance for the display.

4.2. **Display ranges (scales)**

(a) In **information mode** (refer to Chapter 5.1 of this Section) all scales and ranges are permitted.

(b) In **navigation mode** (refer to Chapter 5.2 of this Section), only the successive switchable ranges (scales) specified in Chapter 4.7 of Section 4 of this Annex are permitted.

4.3. **Image positioning and orientation**

(a) In **information mode** all kinds of chart orientation are permitted (see Chapter 5.1 of this Section)

(b) In **navigation mode** the chart shall be automatically positioned and oriented in the relative motion, head-up orientation with the own vessel's position in the screen centre or off-centred (see Chapter 5.2 of this Section).

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 (Standard Information Density)

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— All Display.

The allocation of the feature classes to the display categories is given in detail in the Look-up Tables of the document referred to in point 2(i) of Section 1 of this Annex.

(b) The Display Base category shall contain at least the following features:

— bank of waterway (at mean water level),

— shoreline construction (e.g. groin, longitudinal control dam, training wall – any facility that is considered a hazard to navigation),

— contours of locks and dams,

— boundaries of the fairway/navigation channel (if defined),

— isolated dangers in the fairway/navigation channel under water,

— isolated dangers in the fairway/navigation channel above water level, such as bridges, overhead wires etc.,

— official aids-to-navigation (e.g. buoys, lights and beacons).

(c) The Standard Display (Standard Information Density) category shall contain at least the following features:

— the objects of Display Base category,

— prohibited and restricted areas,

— piers for commercial vessels (cargo and passenger),

— kilometre and hectometre or mile marks on the banks.

(d) The All Display category shall display all features that are contained in the Inland SENC, individually on demand.

(e) When starting the Inland ECDIS, it shall come up with the Standard Information Density as defined in the document referred to in point 2(c) of Section 1 and the Glossary of Terms in Section 5 of this Annex.

(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 in use at all times.

(h) Time variable depth information in the ENC shall be displayed independently of the three display categories referred to in point (a).

4.5. **Display of radar information**

(a) In **navigation mode** the radar image shall have the highest display priority and shall only be permitted to be presented in the relative motion, head-up mode. If the system is also type approved for maritime ECDIS, true motion and north-up mode may be implemented, but only for working in **information mode**.

(b) The underlaid 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.

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(c) The overlaid radar image shall conform to the minimum requirements as specified in Chapter 4.14 of Section 4 of this Annex.

(d) The overlaid radar image may contain additional navigational information. Any additional navigational information and tracking and tracing symbols shall however in no way degrade the display of the original radar content.

4.6. **Display of other navigational information**

(a) Inland ECDIS and additional navigational information (Inland AIS) shall use a common conventional geodetic coordinate reference system.

(b) It shall be possible to display the skipper's own vessel's position on the screen.

(c) It shall be possible for the skipper to select safety depth limits.

(d) Inland ECDIS shall indicate the falling short of the safety depth limits.

4.7. **Colours and symbols**

(a) The display of colours and symbols to represent SENC information shall at least be able to comply with the regulations of Section 3 of this Annex. Additionally other user-selectable symbol sets are permitted.

(b) To present navigational elements and parameters as listed in the document referred to in point 2(d) of Section 1 of this Annex other colours and symbols than those mentioned in point 4.7(a) of this Section shall 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 in **navigation mode** shall provide an indication as to 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 accuracy no less than that afforded by the resolution of the display.

5. OPERATION

5.1. **Information mode**

(a) **Information mode** shall be used 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

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— to the actual vessels heading.

(c) It shall 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.

(e) Information regarding the position and orientation of other vessels, gathered by communication links like AIS, shall be only displayed if they are up-to-date (nearly real-time) and accurate. If the heading of other vessels is not available, the position and the orientation of those other vessels shall not be presented by:

— a directed triangle, or

— a true outline (to scale).

In this case the usage of a generic symbol is recommended.

The following time out values are recommended (from IEC 62388):

Category of vessel	Nominal reporting interval	Maximum time out value	Nominal reporting interval	Maximum time out value
	class A	class A	class B	class B
Vessel at anchor or moored and not moving faster than 3 knots (class B not moving faster than 2 knots)	3 min	18 min	3 min	18 min
Vessel at anchor or moored and moving at more than 3 knots	10 s	60 s	3 min	18 min
Vessel operating in SOLAS mode, moving 0 to 14 knots	10 s	60 s	30 s	180 s
Vessel operating in SOLAS mode, moving 0 to 14 knots and changing course	3 1/3 s	60 s	30 s	180 s
Vessel operating in SOLAS mode, moving 14 to 23 knots	6 s	36 s	30 s	180 s
Vessel operating in SOLAS mode, moving 14 to 23 knots and changing course	2 s	36 s	30 s	180 s
Vessel operating in SOLAS mode, moving faster than 23 knots	2 s	30 s	30 s	180 s

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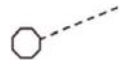
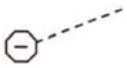
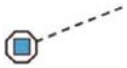
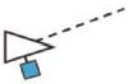
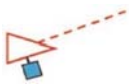
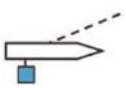
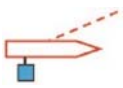
Category of vessel	Nominal reporting interval	Maximum time out value	Nominal reporting interval	Maximum time out value
	class A	class A	class B	class B
Vessel operating in SOLAS mode, moving faster than 23 knots and changing course	2 s	30 s	30 s	180 s
Vessel operating in inland waterway mode	2 – 10 s	60 s	—	—

The AIS targets should be marked as outdated if the position information of moving vessels is older than 30 seconds.

Information on the intention (blue sign) or the number of blue cones of other vessels, the status of signals, weather warnings (from Meteoalarm: www.meteoalarm.eu) and the water level received via Inland AIS may be displayed. The information on the intention (blue sign) shall only be displayed on the right side of the symbol, if the heading of the vessel is available. If no heading information is available the information shall only be displayed in a direction independent form.

The following table is providing an example for the display:

Visualisation of Blue Sign status 0 to 2 and dangerous goods

Blue sign			Not connected or not available		Not Set		Set	
Blue cones			no	1 to 3	no	1 to 3	no	1 to 3
Heading	No	Symbol						
	Yes	Symbol						
		True shape						

(f) Information regarding AIS base stations, AIS Aids to Navigation (ATON) and AIS Search and Rescue Transmitters (SART) may be displayed, if the symbols can be distinguished from other symbols (e.g. symbols 2.10 and 2.11 of IEC 62288 Ed. 2, Table A.2).

(g) Information received by an AIS device and required by local police regulations shall be displayed.

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(h) It shall be possible to display all information transmitted by an AIS on user request.

5.2. **Navigation mode**

(a) In **navigation mode**, the Inland ECDIS display shall be integrated with the own vessel's radar information.

The radar information shall be clearly distinguishable from the SENC information.

(b) The integrated display shall be in accordance with the requirements for radar on inland waterways as specified in Chapter 4.14 of Section 4 of this Annex.

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

(d) The integrated display shall only be presented in the head-up orientation. Other orientations are permitted in systems with an additional maritime ECDIS type approval. If such a system is used in true motion and/or north-up mode on European inland waterways, it is considered to be working in **information mode**.

(e) It shall be possible for the operator to adjust the off-set values between the positions of the position sensor and the radar antenna of the vessel so that the SENC display matches the radar image.

(f) It shall be possible to temporarily remove either the ECDIS or the radar information by a single operator action.

(g) The vessel's position shall be derived from a continuous positioning system, the accuracy of which is consistent with the requirements of safe navigation.

(h) **Navigation mode** shall 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.

(j) In **navigation mode**, the data referred to in Chapter 3.1, point (c), first to seventh indent of this Section, and the following elements shall always be visible and shall not be obscured by other objects:

— Headline line (as required by ETSI EN 302 194-1, see document referred to in Chapter 2, point (f) of Section 1)

— Bearing line (as required by ETSI EN 302 194-1, see document referred to in Chapter 2, point (f) of Section 1)

— Range rings (as required by ETSI EN 302 194-1, see document referred to in Chapter 2, point (f) of Section 1)

— Navigation lines (as required by ETSI EN 302 194-1, see document referred to in Chapter 2, point (f) of Section 1)

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— P-Lines

— Buoys

— Inland AIS symbols

— Inland AIS labels (if displayed)

— AtoN information.

The transparency of the radar overlay shall therefore be user defined. It shall be possible to switch Inland AIS labels off either manually or on base of a configured timeout value.

(k) Information regarding the position and orientation of other vessels, gathered by other communication links than the own radar, may be displayed only if they are up-to-date (nearly real-time) and meet the accuracy that is required for the support of tactical and operational navigation. Position information of the own vessel that is received from a repeater station shall not be displayed.

(l) As tracking and tracing information (for example AIS) of other vessels is useful for the planning of the passing, but of no use during passing itself, tracking and tracing (AIS) symbols shall not disturb the radar image during passing and shall be faded out therefore. Preferably the application shall allow the skipper to define the area where the symbol is faded out.

(m) If the heading of other vessels is available, the position and the orientation of those other vessels may be presented by

— a directed triangle, or

— a true outline (to scale).

In all other cases a generic symbol shall be used (an octagon is recommended, a circle shall not be used for applications which are certified according to maritime standards).

(n) Information that another vessel is carrying blue cones or lights may be displayed by a different colour of the vessel symbol. The number of the blue cones/lights shall only be displayed in the pick report.

(o) Information on the intention of another vessel to pass on starboard (blue sign) may only be displayed on the right side of the directed triangle symbol or of the scaled shape if the heading of this vessel is available. If no heading information is available the information shall only be displayed in a direction independent form.

(p) Information regarding the position of AIS base stations, AIS Aids to Navigation (ATON) and AIS Search and Rescue Transmitters (SART) may be displayed, if the symbols can be distinguished from other symbols (e.g. symbols 2.10 and 2.11 of IEC 62288 Ed. 2, Table A.1).

5.3. **Operation and control elements**

(a) Inland ECDIS shall be designed having regard to ergonomic principles for user-friendly operation.

(b) The Inland ECDIS equipment shall have a minimum of operation and control elements (see Section 4 of this Annex).

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(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 easily retrievable.

6. CONNECTION WITH OTHER EQUIPMENT

(a) Inland ECDIS shall not affect the performance of any connected equipment adversely. Similarly the connection of optional equipment shall not degrade the performance of Inland ECDIS.

(b) Inland ECDIS shall be capable of generating 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 in navigation mode shall be provided with the 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**

(a) Inland ECDIS in **navigation mode** shall provide a suitable alarm or indication of system malfunctions (refer to Chapter 9 of Section 4 of this Annex).

(b) Inland ECDIS in **information mode** shall provide a suitable alarm or indication of missing input from – if connected – GNSS receiver, AIS and heading device.

(c) Inland ECDIS shall provide appropriate alarms or indications of malfunction of the equipment with respect to the displayed information

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 set out in Chapters 5.1 and 5.2 of Section 4 of this Annex.

8.2. **Defects**

(a) If the Inland ECDIS system in navigation mode has an evident defect, it shall provide a suitable alarm (refer to Chapters 4.16 and 9 of Section 4 of this Annex).

(b) Facilities enabling a safe take-over of the functions of Inland ECDIS in navigation mode 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

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

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SECTION 2

DATA STANDARD FOR INLAND ENCs

1. INTRODUCTION

(a) The Data Standard for Inland ENCs describes the technical specifications to be used

— for the exchange of digital hydrographic data between national inland waterway authorities, and

— for its distribution to manufacturers, skippers and other users.

(b) This Data Standard shall be used for the production of Inland ENCs and bathymetric Inland ENCs. The transfer and distribution of Inland ENCs and bathymetric Inland ENCs shall take place in such a way that data integrity is ensured.

(c) This Data Standard is based on the document referred to in point 2(a) of Section 1 (‘S-57’).

(d) 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.

(e) The Data Standard shall be compliant to standards and regulations indicated in points 2(h) and (j) of Section 1.

2. THEORETICAL DATA MODEL

The description of the theoretical data model in Part 2 of S-57 shall apply to the theoretical data model of Inland ENCs and bathymetric Inland ENCs.

3. DATA STRUCTURE

The description of the data structure in Part 3 of S-57 shall apply to the data structure of Inland ENCs and bathymetric Inland ENCs.

4. PRODUCT SPECIFICATIONS FOR INLAND ENCs AND BATHYMETRIC INLAND ENCs

The Product Specifications for Inland ENCs and for bathymetric Inland ENCs enable chart producers to produce a consistent Inland ENC or bathymetric Inland ENC, and manufacturers to use that data efficiently in an Inland ECDIS that satisfies the Performance Standard for Inland ECDIS set out in Section 1.

Data for ENCs shall be made available to all manufacturers of applications. An Inland ENC shall be produced in accordance with the rules laid down in the document referred to in point 2(h) of Section 1 of this Annex and shall be encoded using the following documents referred to therein:

(a) the Inland ENC Feature Catalogue and

(b) the rules described in the Inland ENC Encoding Guide.

A bathymetric Inland ENC shall be produced in accordance with the rules laid down in the document referred to in point 2(j) of Section 1 of this Annex and shall be encoded using:

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(c) the bathymetric Inland ENC Feature Catalogue referred to in point 2(j) of Section 1 of this Annex and

(d) the rules described in the Inland ENC Encoding Guide referred to in point 2(h) of Section 1 of this Annex

Inland ENCs and bathymetric Inland ENCs approved for navigation mode shall be produced in accordance with the 'Data Standard' and the 'Product Specification' referred to in this Section.

SECTION 2A

CODES FOR PRODUCERS AND WATERWAYS (IN ADDITION TO IHO–S-62 ENC PRODUCER CODES

Codes for producers of Inland ENCs as well as the registration procedure are those mentioned in the document referred to in point 2(b) of Section 1 of this Annex ('IHO S-62').

Administrations or private companies which produce Inland ENCs and which are not mentioned in IHO-S-62 and administrations or private companies which decide to produce Inland ENCs shall register a producer code at the S-100 registry of IHO at http://registry.iho.int

Since a producer code alone is not sufficient to establish whether an Inland ENC is appropriate to be used in navigation mode, the competent authorities referred to in Article 8 of Directive 2005/44/EC shall maintain and provide via their official website an up-to-date list of Inland ENCs approved for navigation mode within their geographical area of responsibility. The list shall include the file name of the ENC cell, the stretch of the inland waterway that is covered, the edition number, the issue date and a list of available update files to the currently valid edition also with their issue dates. The list shall include all Inland ENC for which the cell complies with the requirements as regards the minimum content and is approved for navigation mode.

The notification of competent authorities in accordance with Article 8 of Directive 2005/44/EC shall include information on the geographical area of responsibility and the official website of the competent authorities. Member States shall notify the Commission immediately of any changes.

The following Codes for Waterways shall be used in the file name of IENCs:

Waterway Code	Waterway Name	Remark
AC	Albertkanaal/Canal Albert	
AKL	Afleidingskanaal van de Leie	
BA	Balaton	
BCR	Branche de la Croyère	
BED	Benedendijle	
BEN	Beneden-Nete	
BEZ	Beneden-Zeeschelde	
BH	Kanaal Bocholt - Herentals	
BK	Boudewijn Kanaal	

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Waterway Code	Waterway Name	Remark
BLO	Branche de La Louvière	
BME	Basse-Meuse	
BN	Kanaal Briegden - Neerharen	
BOS	Bovenschelde	
BOZ	Boven-Zeeschelde	
BRW	Beetzsee-Riewendsee-Wasserstraße	
BSK	Berlin-Spandauer Schifffahrtskanal	including Westhafenkanal and Charlottenburger Verbindungskanal
BZ	Beneden Zeeschelde	
CCB	Canal Charleroi-Bruxelles	
CCG	Canal du Centre à Grand Gabarit	
CHV	Canal de Haccourt à Visé	
CLA	Canal de Lanaye	
CMO	Canal de Monsin	
CPC	Canal Pommeroeul-Condé	
D	Danube	including Sulina branch
DA	Danube Chilia branch	
DAW	Dahme-Wasserstraße	
DB	Dunare Borcea	
DCC	Danube Cernovoda canal	
DE	Dortmund-Ems Kanal	
DEN	Dender	
DHK	Datteln-Hamm-Kanal	
DDT	Dijledoortocht	
DKW	Kanaal Dessel - Kwaadmechelen	
DR	Drava	
DTS	Kanaal Dessel - Turnhout - Schoten	
DUK	Ráckevei-Duna	
DUM	Mosoni-Duna	
DUR	Gekanaliseerde Durme (Beneden-Durme)	
DUS	Szentendrei-Duna	
DV	Dunarea Veche	
EL	Elbe	
ELK	Elbe-Lübeck-Kanal	

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Waterway Code	Waterway Name	Remark
EH	Elbe-Havel-Kanal	
EMS	Ems	
EPP	Embranchement Principal	
ES	Elbe-Seiten-Kanal	
EV	Estuaire Vaart	Estuary shipping between Zeebrugge and Dutch border
GA	Sf. Gheorghe-Arm	
GMO	Grand Large de Mons	
GPE	Grand Large de Péronnes	
HES	Haut-Escaut	
HO	Havel-Oder-Wasserstraße	
HVK	Havelkanal	
IJZ	Ijzer	
KB	Kanaal naar Beverlo	
KBK	Kanaal Bossuit - Kortrijk	
KGO	Kanaal Gent-Oostende	
KGT	Kanaal Gent-Terneuzen	
KK	Küstenkanal	
KLD	Kanaal Leuven - Dijle	
KND	Kanaal Nieuwpoort - Duinkerken	
KPN	Kanaal Plassendale- Nieuwpoort	
KRL	Kanaal Roeselare - Leie	
KTR	Kanaltrave	
KVE	Kanaal van Eeklo	
LA	Lahn	
LOK	Lokanaal	
LR	Leie/Lys River	
MA	Main	
MD	Main-Donau-Kanal	
ME	Mueritz-Elde- Wasserstraße	
MEU	Meuse	
ML	Mittelland-Kanal	
MMI	Meuse Mitoyenne Sud	

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Waterway Code	Waterway Name	Remark
MO	Mosel	
MOE	Moervaart	
N	Dnipro	
NBP	Canal Nimy-Blaton-Péronnes	
NE	Neckar	
ND	Desna	
NOK	Nord-Ostsee-Kanal	
NPR	Prypiat	
NSU	Sula	
NTK	Netekanaal	
NVO	Vorskla	
OD	Oder	
OL	Olt	
PE	Peene	
PHV	Potsdamer Havel	
PK	Plassendale Kanaal	
RH	Rhine	
RHK	Rhein-Herne-Kanal	
RL	Nederrijn/Lek	
ROG	Ringvaart om Gent	
RU	Ruhr	
RUP	Rupel	
SA	Sava	
SAM	Sambre	
SE	Schelde	
SI	Sió-csatorna	
SKH	Stichkanal Mittelland-Kanal - Hildesheim	
SKL	Stichkanal Mittelland-Kanal - Hannover-Linden	
SKO	Stichkanal Mittelland-Kanal - Osnabrück	
SKS	Stichkanal Mittelland-Kanal - Salzgitter	
SL	Saale	

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Waterway Code	Waterway Name	Remark
SM	Smeermaas	
SO	Spree-Oder-Wasserstraße	
SPI	Spierekanaal	
SR	Saar	
SRV	Schelde-Rijnverbinding	
TEK	Teltowkanal	
TI	Tisza	
TLE	Toeristische Leie (Leie)	
UH	Untere Havel- Wasserstraße	
UWE	Unterweser	from km UWE 0,00
VKN	Verbindingskanaal Nieuwpoort	
WA	Waal	
WDK	Wesel-Datteln-Kanal	
WE	Mittelweser	until km 366,65/UWE 0,00
WOD	Westoder	
ZBS	Zeekanaal Brussel-Schelde	
ZUL	Vertakking van Zulte	
ZWV	Zuid-Willemsvaart	

SECTION 3

PRESENTATION STANDARD FOR INLAND ECDIS

1. INTRODUCTION

(a) This Presentation Standard for Inland ECDIS describes the technical specifications to be used for the presentation of Inland ECDIS data. The presentation shall take place in such a way that none of the information is lost.

(b) This Presentation Standard is based on the document referred to in point 2(c) of Section 1 (‘S-52’).

(c) 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.

(d) The presentation of Inland ECDIS data shall meet the requirements of the Presentation Standard described in Section 3 and the Presentation Library referred to in point 2(i) of Section 1.

(e) Definitions of terms may be found in:

— Part 1, clause 5 of IHO-S-57,

— the document referred to in point 2(g) of Section 1 of this Annex,

— the ‘Glossary for Inland ECDIS’ in Section 5 of this Annex.

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2. THE PRESENTATION LIBRARY FOR INLAND ECDIS

S-57 data sets describe the data standard for Inland ENCs, however, they do not contain any information about how the data is going to be presented. The chart presentation is generated online in the Inland ECDIS application. For that purpose, the Inland ECDIS application uses machine-readable symbolisation instructions for each feature, which is drawn on the screen. For the presentation of ENCs the IHO S-52 standard is mandatory. The S-52 standard contains all rules which are necessary for the symbolisation and presentation of ENCs on the screen.

Since the features, attributes and attribute values for ENCs were extended for Inland ENCs and bathymetric Inland ENCs, an extension of the S-52 standard is necessary in order to be able to display also the Inland specific features. All extensions apply to the document referred to in the fourth indent of point 2(c) of Section 1 of this Annex.

2.1. **Components of S-52 and Inland ECDIS Presentation Library**

2.1.1. The major components of the S-52 presentation library are:

— a library of symbols, line styles and fill styles,

— a colour coding scheme which includes the IHO colour tables for day, dusk and night time,

— a set of symbology command words from which machine readable instructions can be assembled. The result is a symbology instruction, which is processed to symbolise ENC features in turn,

— a set of conditional symbology procedures to decide the appropriate symbolisation in cases determined by the mariner's selection (e.g. safety contour) or for complex symbols (e. g. top marks on buoys and beacons),

— a set of look-up tables that link feature descriptions from the ENC to the appropriate symbology instructions depending on whether:

— the link is straight forward, i.e. a direct relationship between a feature's description and its presentation such as a buoy or a land area. In this case, the look-up table provides the symbology instruction to show a symbol, an area fill, or a line style,

— the link is conditional, i.e. depending on circumstances, for example a depth area, whose colour fill depends on the choice of the safety contour. In this case the look-up table refers the decision to a conditional symbology procedure that selects the appropriate symbology instructions later.

2.1.2. Inland ECDIS shall use all S-52 components plus extensions in:

— Lookup tables

— Symbol library

— Conditional symbology procedures.

The extensions are described in the document referred to in point 2(i) of Section 1.

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2.2. **Look-up tables**

2.2.1. For each geometry type (point, line, area) there is a separate look-up table. Each entry in a look-up table consists of the following fields:

(a) 6-character code of the feature class (acronym);

(b) Attribute combination;

(c) Symbolisation instructions;

(d) Display priority, 0-9 (comparable with drawing layers);

(e) Radar code;

(f) Display category (Display base, standard, all other);

(g) 'Viewing group', more refined grouping of features than the display categories.

Figure 1

Example entry of a look-up table

"LNDMRK","CATLMK17|","SY(TOWERS01)","7","O","OTHER","32250"

In this case the feature LNDMRK is shown by the symbol TOWERS01 with priority 7, if the attribute CATLMK equals 17. The feature lies over the radar.

The presentation of features in a specific area that are contained in different cells of the same usage follows the entries in the look-up tables.

2.2.2. The Presentation Library provides five look-up tables:

— paper chart point symbols,

— simplified point symbols,

— line symbols,

— plain area boundary symbols,

— symbolised area boundary symbols.

2.3. **Conditional symbology procedures (CS)**

CS procedures shall be generated for features of which the symbolisation

— depends on application settings, e.g. safety contour,

— depends on other features, e.g. top marks and their structure,

— is too complex to be defined in a direct look-up table entry.

CS procedures, which shall be modified or implemented in an Inland ECDIS additional to the CS procedures of S-52 are described in the document referred to in point 2(i) of Section 1.

2.4. **Colours**

Colours used in an ECDIS are defined in an absolute manner, independently from the monitor used (using CIE coordinates). This ensures that ECDIS charts look similar on monitors of different suppliers. CIE values are converted into RGB values by means of colour calibration software which must be used by the manufacturer.

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Commercial displays usual in the trade are seen as matching those requirements.

Due to the fact that various light conditions might occur on the bridge of a vessel, it is necessary to offer presentations with different brightness levels. For each level a separate colour table exists.

The represented colour scheme shall be chosen on the basis of ergonomical and physiological factors and the representation of indications in different colours shall not result in mixed colours by superimposing.

2.5. **Presentation of notice marks**

Notice marks which are located at the river bank are presented in the chart displayed by generic symbols (notmrk01, notmrk02 and notmrk03). This does not apply to the notice marks on bridges.

Additionally, applications are required to be able to display the detailed symbol, which is similar to the real world indication, and the full set of object information of a user-selected notice mark.

Notice marks that are located at bridges, shall be symbolised according to the orientation of the bridge.

Notice marks which specify distances or a velocity shall not be symbolised with the number itself, but only with that symbol which gives the general regulation or information.

SECTION 4

OPERATIONAL AND PERFORMANCE REQUIREMENTS, METHODS OF TESTING AND REQUIRED TEST RESULTS

1. INTRODUCTION

This Section specifies the minimum requirements contained in Section 1 of this Annex 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 vessels.

2. OPERATING MODES AND SYSTEM CONFIGURATION

2.1. **Operating modes**

(a) The Inland ECDIS technical specifications distinguish two operating modes: **navigation mode** and **information mode**.

(b) Inland ECDIS equipment designed for operating in **navigation mode** shall fulfil the requirements of this Annex and the standards on navigational radar equipment and rate-of-turn indicators. For Inland ECDIS in navigation mode a type approval is required by competent authorities referred to in point 2(q) of Section 1.

(c) For Inland ECDIS equipment designed for **information mode** only, the requirements of this Section 4 are to be understood as technical (operational and performance) requirements. The producer has to document the conformity with these technical requirements. A type approval is not required for Inland ECDIS in information mode. The documentation shall be made available to competent authorities and users on request.

2.2. **System configurations**

2.2.1. *System configuration 1: Inland ECDIS equipment, stand-alone-system without connection to radar*

In this system configuration only operation in **information mode** is possible (see Section 4B, Figure 1).

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2.2.2. *System configuration 2: Inland ECDIS equipment, parallel installation and connection to radar*

This system configuration allows operation in **information mode** as well as in **navigation mode** (see Section 4B, Figure 2).

2.2.3. *System configuration 3: Inland ECDIS equipment, monitor shared with connected radar equipment*

In this system configuration, the monitor of the radar equipment is shared with the Inland ECDIS equipment. Prerequisite for this mode are matching graphic parameters for both video signals and a video switch, which allows a fast switchover of the video sources (see Section 4B, Figure 3).

This system configuration allows operation in **information mode** as well as in **navigation mode**.

2.2.4. *System configuration 4: Radar equipment with integrated Inland ECDIS functionality*

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

3. PERFORMANCE REQUIREMENTS

3.1. **Hardware performance**

(a) Inland ECDIS in navigation mode 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 Chapter 2.2.4 of this Section, 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 Annex. For the configurations described in Chapters 2.2.2 and 2.2.3 of this Section CE conformity is sufficient.

3.2. **Software performance**

Software for the operation, visualisation, and functionality of Inland ECDIS equipment shall be designed, developed, implemented, and tested in accordance with the software requirements described in Section 4A to this Annex.

3.3. **Performance of operation controls**

(a) The operation of the system shall be simple, appropriate and conform to common human interface standards. The operational state of the system and the connected technical sub devices has to be clearly indicated.

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

(c) Wireless remote controls are not permitted.

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

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

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

3.4. **Display performance**

The provisions of Chapters 3.4.2 to 3.4.7 are recommended for Inland ECDIS in information mode.

3.4.1. *Display dimensions*

(a) In **navigation mode** the minimum chart and radar display area shall be at least 270 mm by 270 mm.

(b) In information mode the requirements of point 4.1(c) of Section 1 shall be applicable.

3.4.2. *Display orientation*

(a) A rectangular display may be mounted in landscape or in portrait orientation under the prerequisite that the minimum dimensions set out in Section 3.4.1 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 × 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 ergonomically proven colour 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 shall occur.

(c) On raster scan displays, the frame repetition rate shall not be lower than 60 Hz.

3.4.7. *Display technology*

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

4. OPERATIONAL FUNCTIONS

4.1. **Operating mode**

(a) If the equipment is able to work in both operation modes it shall provide for the possibility of switching between **navigation mode** and **information mode**.

(b) The operation mode in use shall be displayed.

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(c) Suitable measures are required to prevent the inadvertent switching off of the **navigation mode**.

4.2. **Equipment pre-sets (store/recall) in navigation mode**

(a) After starting 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 in navigation mode**

(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 shall be ensured by appropriate entries into the look-up tables (refer to Section 3 of this Annex, Chapter 2.2, field ‘radar code’). The transparency of the radar overlay shall therefore be user-defined.

(d) Chart and radar picture presentation shall have the same scale.

(e) The heading line shall be always visible.

(f) Additionally, the mariner's own vessel'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 mariner's own vessel's position.

4.5. **Position and bearing of the own vessel**

(a) In **navigation mode**, the own vessel's position shall always be visible in the display area, whether ‘centred’ or ‘off centred’ as specified in the document referred to in point 2(f) of Section 1.

(b) In **navigation mode** the heading line, which runs from the display centre to the top and which shall be always visible, shall represent the heading of the mariner's own vessel.

4.6. **Information density**

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

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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
4 000 m	800 m

(b) Smaller and 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 intervals set out in points (a) and (b) and at least one variable range marker (VRM).

(d) Switching on/off of fixed and variable range markers shall be independent of each other and their display shall be clearly distinguishable.

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

4.8. **Picture brilliance in navigation mode**

(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 shall have 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,6.0 (colour tables) for day, dusk and night shall be supported.

4.10. **Pick report**

(a) It shall be possible to get all underlying textual and/or graphical information concerning user selections of the features that are displayed in the chart.

(b) This additional textual and/or graphical information shall not hamper the view of the waterway in the navigational chart.

4.11. **Measuring features**

(a) Measuring features for distances and bearings are required.

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(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 skippers' own chart entries**

(a) Inland ECDIS equipment shall allow input, storing, modifying and deletion of additional chart information by the skipper (skippers' own features) in navigation mode as well as in information mode.

(b) These own chart entries shall be distinguishable from the SENC data, and shall not overlay or degrade the radar picture in navigation mode.

4.13. **Loading and updating of SENCs**

(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 rollback function shall 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 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 shall not be degraded by other contents of the picture (see also point 4.3(c) of this Section).

(d) Provided the functional requirements are fulfilled, overlaying of different information layers is permitted.

(e) The overlay of information regarding the position and orientation of other vessels is only allowed when:

— the information is up-to-date (real-time), and

— the age of information does not exceed the maximum time out values provided in the first table in point 5.1(e) of Section 1. The symbols shall be marked as outdated, if the age of the information exceeds 30 seconds for moving vessels. The position information of the own vessel shall only be displayed when the position is detected by an on board subsystem and not if the position is received from a repeater station.

(f) The overlaid information derived from tracking and tracing devices regarding the position and orientation of other vessels shall be faded out at a user-definable range. The activation of this feature and the selected range of the restricted area shall be indicated on the display.

(g) Only if the heading of other vessels is available, the position and the orientation of those other vessels may be presented by:

— a directed triangle, or

— a true outline (to scale).

In all other cases a generic symbol shall be used (an octagon is recommended, a circle shall be used for inland applications only).

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(h) It shall be possible to switch off the chart and any other information layer and to display only the radar picture by one easily accessible control element or menu area.

(i) If the quality and plausibility monitoring of the Inland ECDIS equipment detect that the chart cannot be oriented and/or positioned with the accuracy required by this Annex, an alarm shall be presented on the display and the chart shall be switched off automatically. If there is no radar signal, the information mode shall be displayed. In both cases a warning or an alarm shall be given. The switching shall always be possible by manual action.

4.15. **Inland ECDIS functions with immediate access**

(a) The following operational functions require direct access:

— RANGE

— BRILLIANCE

— COLOURS

— INFORMATION DENSITY

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

4.16. **Permanently visible function parameters**

The following function parameters shall always be visible:

— actual RANGE

— sensor STATUS (in **navigation mode**: radar tuning, position quality, alarms; in **information mode**: if connected, GNSS receiver, AIS and heading)

— selected WATER LEVEL (if available)

— selected SAFETY DEPTH (if available)

— selected INFORMATION DENSITY

5. SERVICE FUNCTIONS

Service functions shall be protected by password or other suitable measures against unauthorised access. They shall not be selectable in **navigation mode**.

The requirements of Chapters 5.1 to 5.3 are only applicable to **navigation mode**.

5.1. **Static correction of the chart position**

(a) The position of the mariner's own vessel shall be presented ‘centred’ or ‘off centred’ on the display in accordance with the radar requirements. 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.

(b) 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 vessel's axis shall not be greater than ± 1,0 degree.

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(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 degree.

5.3. **Configuration of interfaces**

(a) It shall be possible to configure interfaces for connected sensors, actors and signals.

(b) Interfaces shall comply with existing interface specifications as defined in the document referred to in point 2(l) of Section 1 and the interface specifications for rate of turn indicators (20 mV/deg/min) as defined in the document referred to in point 2(d) of Section 1.

6. HARDWARE TEST AND REQUIRED CERTIFICATES

(a) The test shall consist of a comparison between the Equipment Under Test (EUT) and the requirements of this Annex.

(b) Proved equivalent tests, and proved and documented test results shall be accepted without renewed tests.

(c) The entire Chapter 6 is valid for navigation mode, but the requirements that do not contain a specific reference to navigation mode are also valid for information mode.

6.1. **Resistance to environmental conditions in navigation mode**

(a) Inland ECDIS equipment, as described in Chapter 2.2.4 of this Section, shall fulfil the requirements of the document referred to in point 2(k) of Section 1 concerning the resistance to environmental conditions (humidity, vibration and temperature; the latter reduced according to Chapter 3.1 of this Section) and concerning electromagnetic compatibility.

(b) The provider or his representative shall submit a relevant conformity declaration of an accredited laboratory.

6.2. **Equipment documentation**

The technical documentation shall be checked to assure that it is complete, appropriate, and understandable, and that it is sufficient for unproblematic installation, configuration and operation of the equipment.

6.3. **Interfaces**

(a) All interfaces shall be documented correctly and completely.

(b) Electronic circuits shall be designed failsafe, mechanically as well as electronically, and shall not have degrading repercussions on connected equipment.

6.4. **Characteristics of operation controls**

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

6.5. **Characteristics of the display in navigation mode**

The display shall fulfil all requirements of this Annex 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 shall be installed, assembled and connected according to the installation manual. After switching on the test SENC shall be loaded.

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7.2. **Test of the operation modes**

All operating modes as described in the operating manual shall be successively started up and tested. The requirements of Chapter 4 of this Section shall be fulfilled.

7.3. **Test of the displayed features**

Whether all features included in the test SENC are visible and correctly displayed shall be tested. For this test, the information density shall be switched to 'all features'. The system shall be capable to at least display all features according to the Presentation Standard for Inland ECDIS (Section 3 of this Annex). Additionally other user-selectable symbol sets are allowed.

If symbols that deviate from the document referred to in point 2(i) of Section 1, the Inland ECDIS Presentation Library, are used for the presentation of any chart information, then they shall:

— be legible,

— be certain and unambiguous in their meaning,

— be of sufficient size to support the nominal viewing distance.

Symbols added to the ECDIS Presentation Library shall be clearly distinguishable from Presentation Library symbols.

7.4. **Test of the scale dependent information density (SCAMIN)**

(a) Whether the SCAMIN functionality (the minimum scale at which the feature may be used for ECDIS presentation) is installed correctly shall be tested.

(b) For this test, the range shall be used at which the feature shall be visible according to its SCAMIN enumeration (refer to Chapter 8.4 of the document referred to in point 2(h) of Section 1).

7.5. **Test of brilliance variation in navigation mode**

The Inland ECDIS equipment shall be operated in a dark room and the brilliance shall be brought to its lowest level. The brilliance of the features 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 colour tables shall be sequentially tested to conform to this Annex.

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 coordinates).

(b) The resolution and increments 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 each test step the version numbers of the loaded SENCs and updates shall be recalled as described in the operation manual and showed on the display.

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— 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 shall be possible to recall and display all concerned features.

7.9. **Test of displayed features in more than one cell for the same area**

(a) It shall be tested whether all features included in the test SENC and in the additional overlay test SENC are visible and correctly displayed. For this test the information density shall be switched to 'all features'.

(b) It shall be tested whether it is possible to select one or more specific cells for presentation if there are several cells from different producers for the same area with the same usage.

(c) It shall be tested whether the test bathymetric Inland ENC is displayed correctly together with the base SENC in accordance with Chapter 6 of the document referred to in point 2(i) of Section 1.

8. TEST OF RADAR PICTURE PRESENTATION AND OPERATION IN NAVIGATION MODE

8.1. **Preparations**

(a) For the test purposes, the manufacturer or provider shall provide a serial interface at the system to be approved (Equipment under test — EUT) which delivers the same actual values (as strings compliant with the document referred to in point 2(l) of Section 1) of position and heading that are used to position and orient the chart.

(b) During the test, a reference system shall be used of which position and heading values are compared with those of the EUT.

(c) The EUT shall be connected to any type approved radar equipment (to the choice of the provider).

(d) The radar picture shall be adjusted in range and bearing with reference to the heading line.

8.2. **Test of the radar picture without under laid chart**

(a) If the Inland ECDIS equipment displays the radar picture but the radar operation control remains at the radar equipment (See Figures 2 and 3 of Section 4B), the radar picture of the inland ECDIS equipment shall be considered as the 'daughter display' of an item of radar equipment. In that case, the radar picture shall fulfil the display and picture-relevant requirements of the requirements for radar and rate-of-turn indicators as defined in the document referred to in point 2(f) of Section 1.

(b) If the EUT is a radar installation with integrated Inland ECDIS functionality (See Figure 4 of Section 4B), all requirements of the standards for radar equipment and rate-of-turn indicators as defined in the document referred to in point 2(f) of Section 1 shall be fulfilled.

8.3. **Test of the radar picture, overlaid information from other vessels and the underlying chart**

The Inland ECDIS equipment shall be installed in a reference environment. This may be real (on a vessel) or simulated. Position

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and orientation information of other vessels (according to the Inland AIS technical specifications) shall be applied with several information ages.

8.3.1. *Test of the radar overlay*

(a) The radar image shall not be degraded by the chart picture (refer to point 4.3(c) of this Section).

(b) The overlay of information regarding the position and orientation of other vessels shall be only displayed when:

— the information is up-to-date (nearly real-time), and

— the age of information does not exceed the maximum time out values provided in the first table in point 5.1(e) of Section 1, Performance Standard for Inland ECDIS. The symbols shall be marked as outdated, if the age of the information exceeds 30 seconds for moving vessels. The position information of the own vessel shall not be displayed, if it is received from a repeater station.

(c) The overlay of information derived from tracking and tracing devices regarding the position and orientation of other vessels shall be faded out at a user-definable range. The activation of this feature and the selected range of the restricted area shall be indicated on the display.

(d) If the heading of other vessels is available, the position and the orientation of those other vessels shall be displayed by:

— a directed triangle, or

— a true outline (to scale)

For all other vessels a generic symbol shall be used (an octagon is recommended, a circle shall be used for inland applications only).

(e) It shall be possible to switch off the chart and any other information layer and to display only the radar picture by one easily accessible control element or menu area.

(f) 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 degree.

(c) The correction of the parameters referred to in points (a) and (b) shall be demonstrated in the service mode.

(d) The dynamic deviation of the chart orientation at rates of turn less than ± 60 degree/min shall be less than ± 3 degree.

(e) These tests shall be performed visually or by evaluation of measured data.

8.3.3. *Test of scale conformity*

The chart's information shall 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.

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9. TEST OF ALARMS AND INDICATIONS

(a) The alarms generated from Inland ECDIS equipment itself as well as the passed alarms delivered to the ECDIS by the connected sensors shall be tested.

(b) The test procedure in **navigation mode** shall comprise 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,

— missing AIS signal.

(c) The test procedure in **information mode** shall comprise the following situations:

— any error in the Inland ECDIS equipment (built-in test equipment - BITE),

— missing positioning signal,

— missing heading signal,

— missing AIS signal.

The Inland ECDIS manufacturers have to confirm in their system documentation that the system includes those test procedures and signal indicators in information mode.

10. TEST OF FALL BACK ARRANGEMENTS IN NAVIGATION MODE

(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 shall be checked to determine whether the measures required by the operator are described adequately and appropriately.

SECTION 4A

MEASURES TO ENSURE SOFTWARE QUALITY

1. GENERAL REQUIREMENTS

Software used in **navigation mode** is a safety-relevant part of a navigation system. Providers of navigation systems shall make sure that all software components used in **navigation mode** allow safe navigation in every situation.

Requirements in Chapters 1.1 to 1.5 are only applicable to **navigation mode**, while requirements in Chapters 1.6 and 1.7 are applicable to both **navigation mode and information mode**.

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1.1. **Software design requirements**

Software components shall be clearly designed by means of established software design methods. The design specification shall indicate how safety requirements are addressed in the software design.

A software style guide shall be provided that specifies code writing style, documentation style, modularisation, conflict analyses and testing of software components. For every software component documents describing specification and design are required.

1.2. **Implementation requirements**

Implementation of software modules shall be done by qualified developers, fully understanding the design and safety requirements.

If more than one developer is working on the navigation system software, a version control system shall be used that guarantees conflict-free development.

The implementation shall be according to the design specification and shall reflect the software style guide. Moreover, well known implementation problems (depending on the language used) shall be addressed in the implementation. This includes but is not restricted to:

— null pointer handling,

— un-initialised variables,

— range checking,

— array size verification,

— memory allocation and de-allocation,

— exception handling.

If parallel processing is used (e.g. multiple threads, tasks or processes) problems of conflict-free processing shall be addressed in the implementation. This includes but is not restricted to:

— race conditions,

— re-entrance problems,

— priority inversion,

— deadlocks.

1.3. **Test requirements**

In accordance with the design specification, software modules shall be tested. The test results shall be compared with the design guidelines and documented in test reports.

Tests shall incorporate module as well as system tests. Providers of a navigation system shall use extensive simulator-based tests to ensure stability of their system. The simulator shall allow the simulation of a complete navigation environment including all required external sensors.

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1.4. **Third party components requirements**

Third party components, such as OEM (original equipment manufacturer) products, include software not developed by the navigation system provider. This includes but is not restricted to:

— static or dynamic linked libraries,

— computer aided design and engineering tools producing source or object code,

— operating systems.

Third party software components shall be chosen according to the general safety requirements. The navigation system provider shall prove that third party components meet the high standards necessary for safe navigation either by providing acceptable quality certificates or by extensive and provable testing of the components.

1.5. **Requirements for additional services in navigation mode**

Navigation systems may support additional services in **navigation mode** if they are useful. These services shall not interfere with other requirement in navigation mode.

The navigation system provider is responsible for additional test equipment, necessary to verify interface specification, protocol specification and compliance tests with the Inland ECDIS technical specifications.

1.6. **Language**

Additional national versions of a type-approved Inland ECDIS shall reapply for type approval to be checked for the translation of the user interface. The type approval process is only foreseen for systems in navigation mode.

The qualified institution which performs the type approval process of an Inland ECDIS system may request an expertise by a certified translator regarding the correct translation in a specific language from the system manufacturer.

1.7. **Documentation requirements for users**

The documentation (manuals) shall contain comprehensive information on the equipment, the installation, the operation and the service of the navigation system. The presentation of user-relevant information shall be clear, understandable and without unnecessary technical terms. The user manual shall at least be available in English, French, German and Dutch. The technical system description may be made available in English only.

2. METHODS OF TESTING AND REQUIRED RESULTS

2.1. **Navigation mode operation test**

2.1.1. *Performance requirements*

The navigation system shall make reliable estimations of position and heading. Moreover, the estimations of position and heading shall be checked by the system for conformity with the required accuracy.

Position and heading information shall be calculated and displayed for the same reference position. This shall normally be the centre of the radar antenna. A new position estimate shall at least be available with every revolution of the radar antenna.

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2.1.1.1. Position

The navigation system shall estimate and display the position of the vessel. The following minimal requirements shall be fulfilled under normal operation conditions:

(a) The average position estimation shall not deviate more than 5 meters from the true position and shall cover all systematic errors.

(b) The standard deviation σ shall be less than 5 meters and shall be based on random errors only.

(c) The system shall be capable to detect deviations of more than 3σ within 30 seconds.

These results shall be verified by a realistic test of at least 60 minutes.

2.1.1.2. Heading

The navigation system shall estimate and display the heading of the vessel. The following minimal requirements shall be fulfilled:

(a) The average heading angle estimation shall not deviate more than 1 degree from the radar heading direction and shall cover all systematic errors. The offset between vessel heading direction and radar heading shall be less than 1 degree.

(b) The standard deviation σ shall be less than 2 degrees and shall be only based on random errors.

These results shall be verified by a realistic test of at least 60 minutes.

2.1.2. *Sensor failure*

The navigation system shall check proper operation of the position and heading estimation online. Problems shall be detected within 30 seconds. In case of malfunction, the navigation system shall inform the user about the problem and its consequences for navigation.

If a critical sensor alarm signalises that the position or the heading does not meet the required accuracy criteria, the navigation chart shall be switched off.

2.1.3. *Performance test interface*

A navigation system provider shall equip navigation systems during the compliance test with a standard IEC 61162-1 interface sending the position and heading information used by the navigation system. This information shall be encoded by IEC 61162-1 sentences (see the document referred to in point 2(k) of Section 1) known as GGA (Global Positioning System Fix Data) and HDT (Heading True). Additional sentences like RMC (Recommended Minimum Navigation Information), ROT (Rate Of Turn) and VTG (Track made good and Ground speed) are accepted.

Those strings shall be sent preferably every 0,1 second, at least every second. Position and heading shall be according to the definitions in Chapter 2.1.1.1 and Chapter 2.1.1.2 of this Section.

2.2. **General software tests**

2.2.1. *Equipment documentation*

The following documents shall be provided for admittance and shall be shipped with every Inland ECDIS used in navigation mode:

— User's manual,

— Installation manual,

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— Service manual.

The following documents and files shall be provided during the admittance procedure and are not required for end users:

— design specification,

— software style guide,

— certificates of third party software components or test and simulation protocols.

The documents and files provided shall allow for a complete verification of compliance with the Inland ECDIS technical specifications.

A user's manual shall be shipped with every Inland ECDIS system.

2.2.2. *Endurance test for navigation mode*

The navigation system shall pass an endurance test of 48 hours of uninterrupted operation under normal operation conditions. The system shall provide standard interfaces for performance and resource monitoring during operation. Monitoring the system shall show no indication of system instability, memory leaking or any kind of performance loss over time. Navigation systems supporting additional services while running in **navigation mode** shall provide the necessary test equipment including all documents mentioned in Chapter 1.7 of this Section.

3. CHANGES TO CERTIFIED NAVIGATION SYSTEMS

3.1. **General requirements**

Navigation systems installed on board shall be functionally equivalent to a system certified by authorities. For every system the navigation system provider shall ship a statement of compliance with the Inland ECDIS technical specifications and its functional equivalence to the certified system.

The competent authority is entitled to check Inland ECDIS compliance of installed systems at any time.

3.2. **Hardware and software changes**

The navigation system provider may change software or hardware as long as Inland ECDIS compliance is maintained. Changes shall be fully documented and submitted to the competent authority, together with an explanation of how the navigation system is affected by those changes. The competent authority may require a partial or complete renewal of certification if considered necessary. The aforementioned also applies to the use of an approved Inland ECDIS with another national version of the operating system.

The following changes do not affect certification of the system and require only a notice to the competent authority:

— minor changes on third party components (e.g. operation system or library updates),

— use of equivalent or better hardware components (e.g. faster microprocessor, newer chip revisions, equivalent graphic card, etc.),

— minor changes in source code or documentation.

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SECTION 4B

SYSTEM CONFIGURATIONS (FIGURES)

Figure 1

Inland ECDIS equipment, self-sufficient system without connection to radar (system configuration 1)

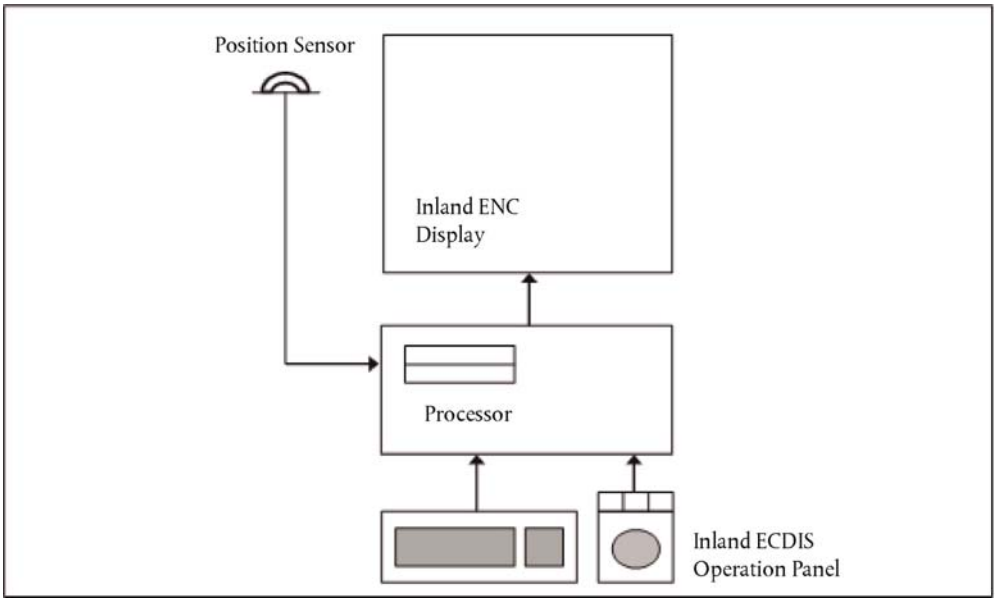

Figure 2

Inland ECDIS equipment, parallel installation with connection to radar (system configuration 2)

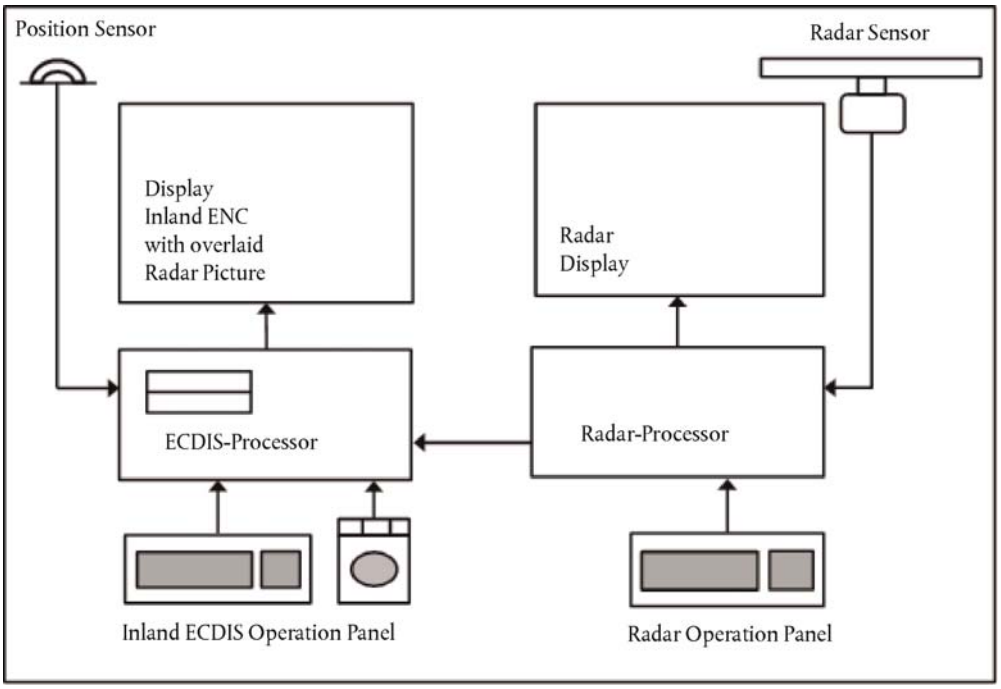

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Figure 3

Inland ECDIS equipment with connection to radar and shared monitor (system configuration 3)

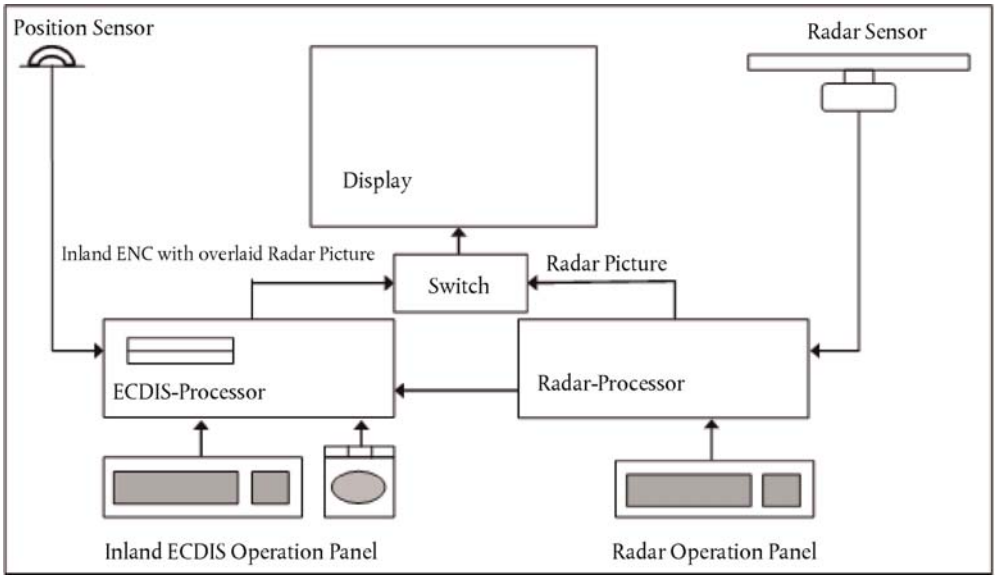
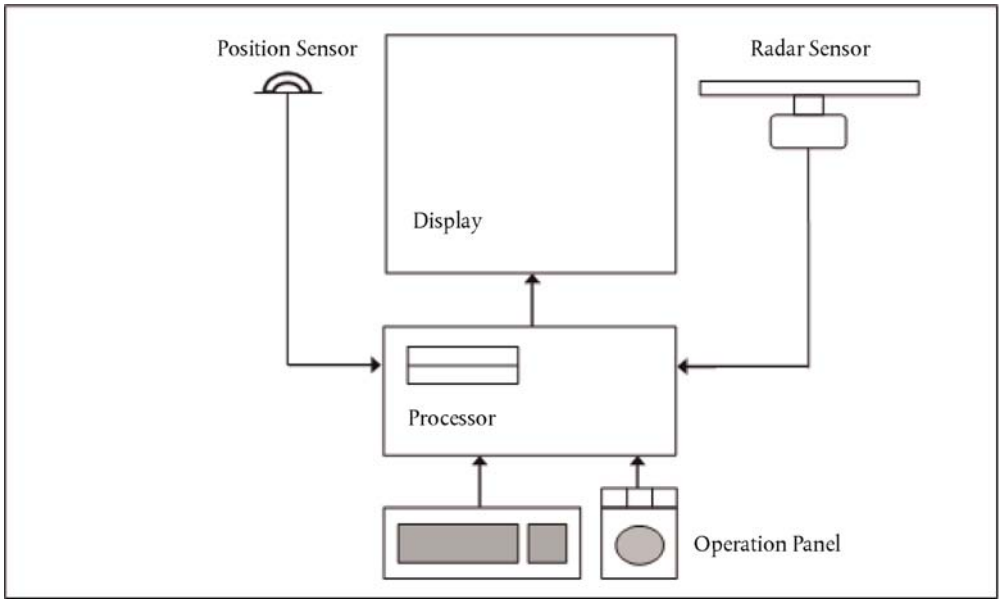


Figure 4

Navigational radar equipment with integrated Inland ECDIS functionality (system configuration 4)



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SECTION 5

GLOSSARY OF TERMS

Term or abbreviation	Definition	Source
Acronym	6-character-code of the feature/of the attribute.	Document referred to in point 2(a) of Section 1
Actor	An actor transforms an electrical quantity into another physical quantity (e.g. optical). An actor is the opposite of a sensor.	
AIS	On-board equipment allowing automatic identification of ships for enhanced ship monitoring as well as voyage data recording and other functions. The automatic identification system should comply with the technical and performance standards laid down in Chapter V of the SOLAS Convention (Safety of Life at Sea).	Document referred to in point 2(r) of Section 1
All information density	All information density (all display) means the maximum amount of SENC information. Here, in addition to the standard display (Standard Information Density), also all other objects are displayed, individually on demand.	Section 1 of this Annex
Attribute	A defined characteristic of an entity (e.g. the category of a light, the sector limits, the light characteristics etc.). Definitions for diverse attributes may be derived from the Feature Catalogue for Inland ENCs referred to in point 2(h) of Section 1 of this Annex.	Document referred to in point 2(a) of Section 1
Cell (chart cell)	A cell is a geographical area containing Inland ENC or bathymetric Inland ENC data.	Document referred to in point 2(a) of Section 1
CIE colour calibration	Procedure to confirm that the colour specified in IHO S-52 is correctly reproduced on the ECDIS display.	Document referred to in point 2(c) of Section 1
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 distinctive points with coordinates given in that datum. The horizontal datum is a set of parameters specifying the reference for horizontal geodetic control, commonly the dimensions and the location of a reference ellipsoid. (The horizontal datum must be compliant with WGS 84.) The vertical datum is 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.	Document referred to in point 2(c) of Section 1 and Document referred to in point 2(n) of Section 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.	Document referred to in point 2(d) of Section 1

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Term or abbreviation	Definition	Source
Display scale	The ratio between a distance on the display and a distance on the ground, normalised and expressed as a ratio, e.g. 1:10 000.	Document referred to in point 2(c) of Section 1
EBL	Electronic Bearing Line	Section 4 of this Annex
ECDIS	Electronic Chart Display and Information System (ECDIS) means a navigation information system which with adequate back-up arrangements can be accepted as complying with the up-to-date chart required by regulations V/19 and V/27 of the 1974 SOLAS Convention, as amended, 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.	Document referred to in point 2(d) of Section 1
Edge	A one-dimensional spatial object, located by two or more coordinate pairs (or two connected nodes) and optional interpolation parameters.	Document referred to in point 2(a) of Section 1
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 Convention.	Document referred to in point 2(c) of Section 1
ENC	Electronic Navigational Chart; the data base, standardised as to content, structure and format, issued for use with ECDIS on the authority of government authorised 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 (e.g. sailing directions) which may be considered necessary for safe navigation.	Document referred to in point 2(d) of Section 1
ENC cell	The geographic division of ENC data for distributing purposes.	Document referred to in point 2(e) of Section 1
ETSI	European Telecommunications Standards Institute	
Enumeration	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).	Document referred to in point 2(o) of Section 1
Feature	An identifiable set of information. A feature may have attributes and may be related to other features. 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).Definitions for diverse features may be derived from the Feature Catalogue for Inland ENCs referred to in point 2(h) of Section 1 of this Annex.	Document referred to in point 2(c) of Section 1

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Term or abbreviation	Definition	Source
Feature catalogue	The comprehensive list of currently identified features, attributes and enumerations which are allowed for the use in Inland ENCs.	Document referred to in point 2(o) of Section 1
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.	Document referred to in point 2(c) of Section 1
GNSS	Global Navigation Satellite System (GNSS) is a system that uses satellites to provide autonomous geo-spatial positioning.	
Heading	The direction in which the longitudinal axis of a craft is pointed, usually expressed as an angular distance from north clockwise through 360 degrees (true, magnetic or compass).	Document referred to in point 2(c) of Section 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 vessel's heading. This orientation may require frequent rotations of the display content. Changing the vessel's course, or yawing of the vessel may render this unstabilised orientation mode illegible.	Document referred to in point 2(c) of Section 1
Human Machine Interface (HMI)	The user interface or human–machine interface is the part of the machine that handles the human–machine interaction. The engineering of the human–machine interfaces is enhanced by considering ergonomics (human factors). There are many ways to develop human-machine interface (HMI) screens for machine and process automation applications. Guidelines, standards, and handbooks covering HMI design include those published by ISA, ASM, ISO, and NUREG.	
IEC	International Electrotechnical Commission: An international (non-governmental) organisation which produces world standards for electrical and electronical engineering with the objective of facilitating international trade.	Document referred to in point 2(c) of Section 1
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.	Document referenced in point 2(c) of Section 1
IHO registry	IHO Geospatial Information Infrastructure Registry. A registry is the information system on which a register is maintained. In the case of S-100 IHO hosts a registry that provides a facility to store various registers of hydrographic-related information.	Document referenced in point 2(m) of Section 1
IMO	International Maritime Organization: formerly called IMCO, the IMO is the specialised agency of the United Nations responsible for maritime safety, efficiency of navigation and prevention of marine pollution from vessels.	Document referenced in point 2(c) of Section 1

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Term or abbreviation	Definition	Source
Information Mode	Means the use of the Inland ECDIS for information purposes only without overlaid radar image.	Section 1 of this Annex
Inland AIS	Automatic identification system for inland waterway vessels as set out in the Regulation (EC) No 415/2007 for vessel tracking and tracing systems.	Document referenced in point 2(p) of Section 1
Inland ECDIS	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.	Section 1 of this Annex
Inland ENC (IENC)	Inland Electronic Navigational Chart (IENC) means the database, standardised as to content, structure and format, for use with inland electronic chart display and information systems operated on-board of vessels transiting inland waterways. An IENC is issued by or on the authority of a competent government agency, and conforms to standards initially developed by the International Hydrographic Organization (IHO) and refined by the Inland ENC Harmonization Group. An IENC contains all the chart information necessary for safe navigation on inland waterways and may contain supplementary information in addition to that contained in the paper chart (e.g. sailing directions, machine-readable operating schedules, etc.) which may be considered necessary for safe navigation and voyage planning.	Section 1 of this Annex
Inland ENC domain	Domain within the IHO Geospatial Information Infrastructure Registry dedicated for Inland ENC – related entries.	Document referenced in point 2(m) of Section 1
Inland SENC	Inland System Electronic Navigational Chart: a database resulting from the trans formation 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.	Section 1 of this Annex
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.	Section 1 of this Annex
Look-up table	A table giving symbology instructions to link SENC objects to point, line or area symbolisation and providing display priority, radar priority, IMO category and optional viewing group.	Document referred to in point 2(c) of Section 1
Navigation mode	Means the use of the Inland ECDIS for conning the vessel with overlaid radar image.	Section 1 of this Annex

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Term or abbreviation	Definition	Source
North-up display	Information shown on the display (radar or ECDIS) with the north direction upward.	Document referred to in point 2(c) of Section 1
Other navigational information	Navigational Information not contained in the SENC, that may be displayed by an ECDIS, such as radar information.	Document referred to in point 2(c) of Section 1
Own vessel	The term which identifies the vessel upon which an ECDIS is operating.	Document referred to in point 2(c) of Section 1
Own vessel's safety contour	The contour related to the own vessel selected by the mariner from 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.	Document referred to in point 2(c) of Section 1
Performance standard for ECDIS	Standard developed under the authority of IMO to describe the minimum performance requirements for navigational devices and other fittings required by the SOLAS Convention, included in MSC.232(82), as adopted by IMO on 5 December 2006.	Document referred to in point 2(c) of Section 1
Pick report (feature report)	The result of querying a displayed point-symbol, line or area for further information from the data base which is not represented by the symbol.	Document referred to in point 2(c) of Section 1
Presentation library for ECDIS	A set of mostly digital specifications, composed of symbol libraries, colour schemes, look-up tables and rules, linking every feature and attribute of the SENC to the appropriate presentation of the ECDIS display. Published by IHO as Annex A, Special Publication No 52 (S-52).	Document referred to in point 2(c) of Section 1
Product specification	A defined subset of the entire specification combined with rules, tailored to the intended usage of the transfer data. (The ENC Product specification specifies the content, structure and other mandatory aspects of an ENC.)	Document referred to in point 2(c) of Section 1
(Radar) range	Distance from the radar antenna. For inland navigation the radar range has to be sequential switchable according to the Radar Regulations.	Document referred to in point 2(q) of Section 1
Relative motion display	A relative motion display shows the chart information and radar targets moving relative to the vessel position fixed on the screen.	Document referred to in point 2(c) of Section 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.	Document referred to in point 2(d) of Section 1
SCAMIN	The minimum scale at which the feature may be used e.g. for ECDIS presentation.	Document referred to in point 2(a) of Section 1

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Term or abbreviation	Definition	Source
SENC	System Electronic Navigational Chart: An internal data base in an Inland ECDIS which results out of the transformation of ENCs and their update files and other data added by the boat master. It is this data base that is actually accessed by the ECDIS for the display generation and other navigational functions. The SENC may also contain information from other sources.	Document referred to in point 2(c) of Section 1
Spatial object	An object which contains locational information about real world entities.	Document referred to in point 2(c) of Section 1
Standard Information Density	The default amount of SENC information that shall be visible when the chart is displayed when ECDIS is switched on. A screen with Standard Information Density (standard display) is the default state of the Inland ECDIS.	Section 1 of this Annex
[Vessel] Tracking and Tracing	Tracking: function of maintaining status information on the vessel, possibly combined with information on cargo and consignments; tracing: and the retrieval of information concerning the whereabouts of the vessel, possibly combined with information on cargo, consignments and equipment, as set out in the Regulation (EC) No 415/2007 for vessel tracking and tracing systems.	Document referred to in point 2(p) of Section 1
True motion display	A display in which the own vessel and each radar target moves with its own true motion, while the position of all charted information remains fixed.	Document referred to in point 2(c) of Section 1
User-defined settings	Means the possibility to use and store a profile of display and operation controls- settings.	Section 1 of this Annex
VRM	Variable Range Marker.	Section 4 of this Annex
WGS 84	World Geodetic System: The geodetic basis for the 'Navigational Satellite Timing and Ranging — Global Positioning System', which enables the surveying of the earth and its entities and was developed by the United States Department of Defence. This global geodetic reference system is recommended by IHO for hydrographic and cartographic use.	Document referred to in point 2(n) of Section 1

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Appendix 1

Comparison of the structures of the standard for (Maritime) ECDIS and of the technical specifications for Inland ECDIS

(Maritime) ECDIS	Inland ECDIS	OPEN ECDIS FORUM http://ienc.openecdis.org
IMO MSC.232(82) revised Performance Standards for ECDIS, December 2006 Appendix 1: Reference Documents Appendix 2: SENC Information available for display during route planning and route monitoring Appendix 3: Navigational Elements and Parameters Appendix 4: Areas for which special conditions exist Appendix 5: Alarms and Indicators Appendix 6: Back-up requirements Appendix 7: RCDS mode of operation	SECTION 1: Performance Standard	
IHO S-57: Transfer Standard for Digital Hydrographic Data, Edition 3.1, Supplement No 2, June 2009 Part 1: General Introduction Part 2: Theoretical Data Model Part 3: Data Structure Appendix A: IHO Object catalogue Introduction Chapter 1: Object Classes Chapter 2: Attributes Annex B: Attributes/Object Classes Cross Reference Appendix B: Product specifications Appendix B.1: ENC Product Specification Annex A: Use of The Object Catalogue for ENC Annex B: Example of CRC Coding Appendix B.2: IHO Object Catalogue Data Dictionary Product Specification	SECTION 2: Data Standard for Inland ENCs	Inland ENC Feature Catalogue Bathymetric Inland ENC Feature Catalogue Product Specification for Inland ENCs Product Specification for bathymetric Inland ENCs IENC Encoding Guide
IHO S-62 ENC Producer Codes, Edition 2.5, December 2009	SECTION 2a: Codes for Producers and Waterways	Codes for Producers and Waterways

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(Maritime) ECDIS	Inland ECDIS	OPEN ECDIS FORUM
IHO S-52 Specification for Chart Content and Display Aspects of ECDIS, Edition 6, March 2010 Annex A: IHO ECDIS Presentation Library Annex B: Procedure for initial calibration of colour displays Annex C: Procedure for maintaining the calibration of displays Appendix 1: Guidance on Updating the Electronic Chart Annex A: Definitions and Acronyms Annex B: Current Updating Practice for Paper Charts Annex D: Estimate of Data Volume	SECTION 3: Presentation Standard	Presentation Library for Inland ECDIS Look-up Tables Symbols Conditional Symbology Procedures
IEC 61174 Edition 3.0: ECDIS — Operational and Performance Requirements, Methods of Testing and Required Test Results, 2008-09	SECTION 4: Operational and Performance Requirements, Methods of Testing and Required Test Results SECTION 4A: Measures to Ensure Software Quality SECTION 4B: System Configurations	
S-32 Appendix 1: Hydrographic Dictionary – Glossary of ECDIS-Related Terms	SECTION 5: Glossary of Terms	