Economic and Social Council

Economic Commission for Europe

Inland Transport Committee

Working Party on Inland Water Transport

**Working Party on the Standardization of Technical
and Safety Requirements in Inland Navigation**

Fifty-fourth session
Geneva, 13-15 February 2019
Item 9 (b) of the provisional agenda
**Promotion of River Information Services and other Information
and Communication Technologies in inland navigation:
Recommendation on electronic chart display and information system
for inland navigation (resolution No. 48, revision 3)**

Amendments to the Recommendation on electronic chart display and information system for inland navigation (resolution No. 48, revision 3)

Transmitted by the Chair of the International Inland ECDIS Expert Group

Mandate

1.   This document is submitted in line with cluster 5: Inland Waterway Transport, paragraph 5.1 of the programme of work 2018-2019 (ECE/TRANS/SC.3/2017/24) adopted by the Inland Transport Committee at its eightieth session (20-23 February 2018).

2.   The annex to this document contains a proposal for amending Part D of the Recommendation on electronic chart display and information system for inland navigation adopted by resolution No. 48. This proposal is based on the revised Inland ECDIS standard introduced by the European Commission Implementing Regulation amending the Commission Implementing Regulation (EC) No. 909/2013 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.

3.   The Working Party may wish to start considering the proposed amendments and decide as appropriate.

Annex*

Amendment proposal to the annex to resolution No. 48, "Recommendation on electronic chart display and information system for inland navigation", revision 3

A.   Remarks by the secretariat

1.   The proposed draft contains references to documents on Inland ECDIS included in the main text. The Working Party may wish to replace them by the links to chapter 2 of section 1, where the updated list of references is provided.

2.   In the whole text, the references to the present technical specifications are replaced by this annex. The Working Party may wish to consider this replacement and decide as appropriate.

3.   The text contains some minor editorial amendments that are not marked. The detailed draft reflecting all amendments will be available as an informal document for the fifty-fourth session of the Working Party.

4.   The text of the chapters and paragraphs that have not been modified, is not reproduced in this document.

5.   Amended subsection (e) of section 2A of the draft can be found in Informal document SC.3/WP.3 No. 2 (2019) in English only and the amended section 5 — in a separate working document for the session.

B.   Part D. Technical Specifications for Electronic Chart Display and Information System for Inland Navigation (Inland ECDIS) (Edition 2.4)

Section 1: Performance Standard for Inland ECDIS

1.   ~~Introduction~~ 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;

    (~~a~~**b**)   Inland ECDIS **aims to** ~~contributes~~ to safety and efficiency of inland shipping ~~and thereby to the protection of the environment~~;

    ~~(b)   Inland ECDIS reduces the navigational workload as compared to traditional navigation and information methods;~~

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    *   *Note by the secretariat:* unless indicated otherwise, the text proposed for deletion is ~~strikethrough~~, the new text is **bold** (in the main text) and *italics* (in titles). The terms "navigation mode" and "information mode" are not marked bold to avoid misleading.

(c)   Inland ECDIS can be designed for both information mode and navigation mode~~¹~~ 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 ~~the~~ navigation mode **of** Inland ECDIS (Operating System Software, Application Software and Hardware) as specified in section 4 of this annex must, Inland ECDIS (Operating System Software, Application Software and Hardware) must have a high level of reliability and availability; at least of the same level as other means of navigation;

(e)   Inland ECDIS must use chart information as specified in sections 2 and 3 of **this annex**;

(f)   ~~Inland ECDIS must facilitate simple and reliable updating of the Inland Electronic Navigational Chart~~ **National authorities and international bodies are recommended to consider transitional provisions when they are introducing carriage requirements for Inland ECDIS**;

~~(g)   Inland ECDIS must provide appropriate alarms or indications with respect to the information displayed or malfunction of the equipment;~~

(~~h~~**g**)   Inland ECDIS must meet the requirements of this performance standard.

(h)   The terms "skipper" and "boatmaster" used in this annex must shall be deemed to be equivalent with the term "ship master" used in the Guidelines and recommendations for River Information Services (resolution No. 57) [and RIS Guidelines - Commission Regulation (EC) No. 414/2007][2];

(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 IHO Special Publication S-52, "Specifications for Chart Content and Display Aspects of ECDIS", 6th Edition, March 2010, 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 International Convention for the Safety of Life at Sea, 1974 (SOLAS), as defined in the Guidelines and Recommendations for River Information Services (resolution No. 57). Inland AIS refers to the automatic identification system for inland waterway vessels as set out in the International Standard for Tracking and Tracing on Inland Waterways

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[1]   ~~On wide inland waterways, Basin Administration may waive the requirement concerning the differentiation between the "navigation mode" and "information mode" of usage of Inland ECDIS, just as it is the case in the IHO Standard S-52.~~

[2]   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).

(VTT) (resolution No. 63). 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, ~~including~~ 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 **(hereafter S-52)**

- S-52 Appendix 1 "Guidance on Updating the Electronic Navigational Chart", Edition 4.0, April 2012;

- **Former S-52 Appendix 2 "Colours and Symbols Specifications", Edition 4.3 (January 2008)**

- **Former S-52 Appendix 3 "Glossary of ECDIS-related Terms Specifications" (now S-32, Appendix 1 (September 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,~~ **International Standard IEC 61174,** edition 3.0 **"Maritime navigation and radiocommunication equipment and systems – Electronic chart display and information system (ECDIS)** – Operational and performance requirements, methods of testing and required test results", 2008~~9~~;

(f) ~~EU Directive 2006/87/EC as amended by 2013/49/EU and Article 7.06 and Annex M of the Rhine Vessel Inspection Regulation laying down technical requirements for inland waterway vessels, Annex IX, Parts III to VI, "Requirements applicable to signal lights, radar installations and rate-of-turn indicators"~~ **Annex 5, Sections I to III of the European Standard laying down Technical Requirements for Inland Navigation vessels Edition 2017 (ES-TRIN 2017): Requirements applicable to radar installations and rate-of-turn indicators;**

(g) IHO Special Publication S-32, Appendix 1 "**Hydrographic Dictionary –** 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'.~~

(~~k~~**h**)   ~~EN~~ **IEC** 60945 (2002) and Corr.1 (~~2010~~ **2008**): Marine navigational equipment; General requirements – Methods of testing and required test results;

~~(i)   DC Recommendations on the main technical and operational parameters for the radar installations used for the navigation on the Danube, CD/SES 60/10, Budapest, 2003;~~

(~~j~~**i**)   Resolution No. 61, revised, "Recommendations on Harmonized Europe-Wide Technical Requirements for Inland Navigation Vessels", Appendix 7, Part III "General technical specifications applicable to radar equipment" (ECE/TRANS/SC.3/172/ Rev.~~1 and Amends. 1 and 2~~ **2**);

(~~l~~**j**)   **International standard IEC 61162, "Maritime navigation and radiocommunication equipment and systems – Digital interfaces";**

(k)   IENC Domain in the S-100 Geospatial Information Registry;

(l)   IEHG Product Specification for Inland ENCs;

(m)   IEHG Inland ENC Feature Catalogue;

(n)   International Standard for Tracking and Tracing on Inland Waterways (VTT) (resolution No. 63);

(o)   Annex II of Directive 2016/1629 of the European Parliament and of the Council of 14 September 2016 laying down technical requirements for inland waterway vessels;

(~~k~~**p**)   Resolution No. 57, revised, "Guidelines and Recommendations for River Information Services" (ECE/TRANS/SC.3/165/Rev.1)**.**

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 Inland ENC:

• waterway axis with kilometres and hectometres or miles **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. groyne, 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)

- waterway axis with kilometres and hectometres or miles

- location of ports and transhipment sites

- reference data for water level gauges relevant to navigation

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

If the chart producer is using overlay files or bathymetric Inland ENCs the features may be included in different 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 within its geographical area of responsibility which of the above named features **referred to in point (c)** are to be verified. **After verification**, the respective competent authority must declare which Inland ENCs and bathymetric Inland ENCs are approved for navigation mode within its geographical area of responsibility;[3] (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. These updates must be applied to the Inland–SENC automatically. The implementation procedure **of the update** must not interfere with the display in use;

(b)   Inland ECDIS must allow **for the** display of updates, so that the skipper may review their contents and ascertain that they have been included in the Inland SENC;

(c)   Inland ECDIS must be capable of revoking automatically applied updates of the Inland ENC data;

(d)   Original Inland ENC editions and later updates must never be merged;

(e)   The Inland ENC and all updates to it must be displayed without any degradation of their information content;

(f)   The Inland ENC data and updates to it must be clearly distinguishable from other information;

(g)   Inland ECDIS must ensure that the Inland ENC and all updates to it have been correctly loaded into the Inland SENC;

(h)   Inland ECDIS must keep a record of updates, including the time of application to the Inland SENC;

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[3] For further details see Section 2a of these technical specifications.

(i)   The contents of the Inland-SENC to be used must be adequate and up-to-date for the intended voyage.

4.   Presentation of Information

4.1   Display Requirements ~~and Recommendations~~

(a)   The display method must 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 must be at least 270 mm by 270 mm for equipment designed and admitted for the navigation mode;

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

The display diagonal ~~may not be smaller~~ **shall be equal to or larger** than 199 mm (7.85 inch). Under all conditions the ~~shipmaster~~ **boatmaster** must be capable ~~to perceive~~ of perceiving the displayed information sufficiently **in accordance with the Human Machine Interface guidelines.**[4]

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.[5]

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

- alphanumeric data and text must 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 should be 3.5 mm

- the manufacturer's documentation shall identify the nominal viewing distance for the display equipment

- ~~for the size of the display it is recommended to use the size as specified for navigation mode in this standard. In case space for the installation of the display is an issue the display size might be reduced taking into account the nominal viewing distance for the display. In any case, the display diagonal may not be smaller than 199 mm (7.85 inch). Under all conditions the shipmaster must be capable to perceive the displayed information sufficiently[6]~~

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[4] *Note by the secretariat:* former subparagraph (c).
[5] *Note by the secretariat:* former subparagraph (c).
[6] *Note by the secretariat:* see subparagraphs (f) and (c).

> • if the software is sold without 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.[7]

(e **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 this standard. In case **In the event that** space for the installation of the display is an issue **a problem,** the display size might be reduced taking into account the nominal viewing distance for the display.[8]

4.2   Display Ranges (Scales)

(a)   In information mode [9] **(refer to chapter 5.1 of this section),** all scales and ranges are permitted;

(b)   In navigation mode [10] **(refer to chapter 5.2 of this section)**, only the successive switchable ranges (scales) specified in section 4, chapter 4.7 of this annex are permitted.

4.3   Image Positioning and Orientation

(a)   In information mode all kinds of chart orientation are permitted;[3] **(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).**[10]

4.4   Display of Inland SENC Information

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

- Display Base

- Standard Display **(Standard Information Density)**

- 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** Appendix 2, "**Status of the** Presentation Library for Inland ECDIS", of **this annex**.

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

- bank of waterway (at mean water level)

- shoreline construction (e.g. groyne, 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)

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[7]   *Note by the secretariat:* see subparagraph (c).
[8]   *Note by the secretariat:* former subparagraph (c).
[9]   See Chapter 5.1 of this Section.
[10]   See Chapter 5.2 of this Section.

- 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 category must 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 must display all features that are contained in the Inland SENC, individually on demand;

(e)   When **starting** ~~invoking~~ the Inland ECDIS, it must come up with the Standard Information Density ~~at an appropriate range available in the Inland SENC for the displayed area~~ **as defined in** ~~IHO Special Publication~~ S-52~~, "Specifications for Chart Content and Display Aspects of ECDIS", 6th Edition, March 2010~~ **and the Glossary of Terms in section 5 of this annex;**

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

(g)   Inland ECDIS must clearly indicate the information density ~~currently~~ in use at all times;

(h)   Time variable depth information in the **Inland** ENC shall be displayed independently of the ~~above named~~ three display categories **referred to in subparagraph (a).**

4.5   Display of Radar Information

(a)   In **navigation mode**, the radar image must have the highest display priority and must 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** ~~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~~;

(b)   The underlaid Inland SENC must match in position, range and orientation. The radar image and the position from the position sensor must both be adjustable for the antenna offset to the conning position;

(c)   The overlaid radar image must conform to the minimum requirements as specified in section 4, chapter 4.14 of this annex;

(d)   The overlaid radar image may contain additional navigational information. Any additional navigational information and tracking and tracing symbols must 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)** must 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 ~~Inland~~ SENC information **shall at least be able** to comply~~, at least,~~ 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 IMO Resolution MSC.232(82), Appendix 3, other colours and symbols than those mentioned in subparagraph (a), chapter 4.7 **of this section** shall be used;

4.8   Data and Display Accuracy

(no modifications)

5.   Operation

5.1   Information Mode

(a)   Information mode must 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 navigation mode and the chart orientation either:

- to north, or

- to the fairway axis at the actual position, or

- 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 the 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, must be displayed only 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 other vessels shall **not be presented** by:

- a directed triangle, or

- a true outline (to scale)

~~must not be presented if the heading of these other vessels is not available.~~ **In this case, the usage of a** generic symbol is recommended.
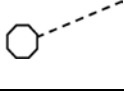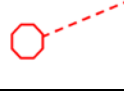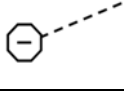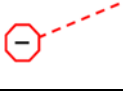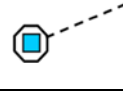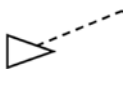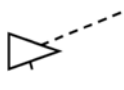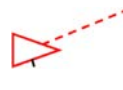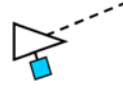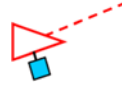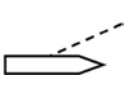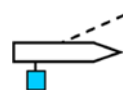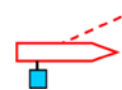
The following time out values are recommended (**from IEC 62388**):[11]

Category of vessel	Nominal reporting interval class A	Maximum time out value class A	Nominal reporting interval class B	Maximum time out value 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 at 0 to 14 knots	10 s	60 s	30 s	180 s
Vessel operating in SOLAS mode, moving at 0 to 14 knots and changing course	3 1/3 s	60 s	30 s	180 s
Vessel operating in SOLAS mode, moving at 14 to 23 knots	6 s	36 s	30 s	180 s
Vessel operating in SOLAS mode, moving at 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
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.

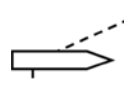Information on the intention (blue sign) or the number of blue cones of other vessels, the status of signals, weather warnings (~~EMMA~~ **from Meteoalarm: www.meteoalarm.eu**) and the water level received via Inland AIS may be displayed. The information on the intention (blue sign) must only be displayed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

The following table is providing an example for the display:

Visualization 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
No — Symbol						
Heading / Symbol						
Yes — 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 Edition 2, Table A.2);

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

(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 must be integrated with the **own** vessel's ~~own~~ radar information. The radar information must be clearly distinguishable from the SENC information;

(b) The Integrated Display must be in accordance with the requirements for radar on inland waterways as specified in section 4, chapter 4.14 of this annex;

(c) The chart and the radar image must match in size, position and orientation within the limits as specified in section 4, chapter 3.4 and 8.3.2 of this annex;

(d) The Integrated Display must 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;[12]

(e) It must 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 must be possible to **temporarily** remove either the ECDIS or the radar information by a single operator action ~~temporarily~~;

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

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[12] On wide inland waterways, Basin Administration may allow the true motion and north-up orientation of the picture.

(h)   Navigation mode must provide an indication when the input from the position-fixing system is lost;

Navigation Mode must 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 must be based on the same geodetic datum;

(j)   In navigation mode the data ~~according~~ **referred** to chapter 3.1 (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 Annex 5, Sections I to III of ES-TRIN 2017)**

- **Bearing line (as required by ETSI EN 302 194-1, see Annex 5, Sections I to III of ES-TRIN 2017)**

- **Range rings (as required by ETSI EN 302 194-1, see Annex 5, Sections I to III of ES-TRIN 2017)**

- **Navigation lines (as required by ETSI EN 302 194-1, see Annex 5, Sections I to III of ES-TRIN 2017)**

- **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 ~~vessel's~~ own radar, ~~are permitted to~~ 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 must 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 must not disturb the radar image during passing and must be faded out therefore. Preferably the application must allow the skipper to define the area where the symbol is faded out;

(m)   **If the heading of other vessels is available,** the ~~presentation of the~~ position and the orientation of other vessels **may be presented** by:

- a directed triangle, or

- a true outline (to scale)

~~are permitted only if the heading of these other vessels is available.~~ In all other cases a generic symbol must be used (an octagon is recommended, a circle must 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 must 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 must 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 Edition 2, Table A.1).

5.3   Operation and Control Elements

(no modifications)

6.   Connections with other Equipment

(no modifications)

7.   Indications and Alarms

7.1   Built-in Test Equipment (BITE)

(no modifications)

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)**[13]**;**

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

8.   Fallback Arrangements

(no modifications)

9.   Power Supply in Navigation Mode

The Inland ECDIS must have its own separate~~,~~ fused power supply.

Section 2: Data Standard for Inland ENCs

1.   Introduction

(a)   ~~This~~ **The** "Data Standard for Inland ENCs" describes the technical specifications to be used:

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[13] ~~See Section 4, Chapter 9 of these technical specifications.~~

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

- **f**or its distribution to manufacturers, skippers and other users.

(b) This Data Standard must 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 ~~none of the information is lost~~ **data integrity is ensured**;

(c) This Data Standard is based on the IHO Transfer Standard for Digital Hydrographic Data, Special Publication No. 57, Edition 3.1, Supplement 2, with all Appendices and Annexes (see comparison table in the preface of these technical specifications), hereafter 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) This Data Standard **must be compliant to Appendix 1, "Product Specification for Inland ENCs" and Appendix 3, "Product Specification for bathymetric Inland ENCs" to this annex.** ~~comprises:~~

- ~~this Section 2;~~

- ~~Appendix 1.0, "Product Specification for Inland ENCs", Appendix 1.1, "Inland ENC Feature Catalogue", and Appendix 1.2, "Encoding Guide for Inland ENCs"; and~~

- ~~Appendix 3.0, "Product Specification for Bathymetric Inland ENCs", and Appendix 3.1, "Feature Catalogue for Bathymetric Inland ENCs".~~

2. Theoretical Data Model

(no modifications)

3. Data Structure

(no modifications)

4. Product Specification for Inland ENCs and bathymetric Inland ENCs

(a) The Product Specifications for Inland ENCs[14] and for bathymetric Inland ENCs[15] **are sets of specifications intended to** 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**.[~~16~~]

(b) Data for **Inland** ENCs shall be made available to all manufacturers of applications.

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[14]   See Appendix 1.0.
[15]   See Appendix 3.0.
[~~16~~]   ~~See Section 1.~~

An Inland ENC shall be produced in accordance with the rules **laid down in appendix 1 "Product Specification for Inland ENCs", edition 2.4** and shall be encoded **using the following documents referred to therein**:

- the Inland ENC Feature Catalogue **(appendix 1.1)**;[17] and

- the rules described in the Inland ENC Encoding Guide **(appendix 1.2)**.[18]

A bathymetric Inland ENC shall be produced in accordance with the rules laid down in **appendix 3 "Product** Specification **for bathymetric Inland ENCs", edition 2.4** ~~defined in these technical specifications~~ and shall be encoded using:

- the bathymetric Inland ENC Feature Catalogue **(appendix 3.1)**,[19] and

- the rules described in the Inland ENC Encoding Guide **(appendix 1.2)**[20].

(c)　　~~Official~~ Inland ENCs and bathymetric Inland ENCs **approved for navigation mode** shall be produced in accordance with the ~~latest version of the~~ "Data Standard" ~~including~~ **and** the "Product Specification" **referred to in this section**.

5.　Definitions[21]

(deleted)

Section 2A: Codes for Producers and Waterways *(in addition to IHO-S62 ENC Producer Codes)* [22]

(a)　　Codes for producers of Inland ENCs as well as the registration procedure are those mentioned in IHO S-62.

(b)　　Administrations or private companies which produce Inland ENCs and which are not ~~already~~ 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 ~~https://navbar.html~~ **http://registry.iho.int**;

(c)　　Since a producer code alone is not sufficient to ~~judge~~ **establish** whether an Inland ENC is appropriate ~~for~~ **to be used in** navigation mode, the ~~following declaration process is applicable~~ **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 the competent authorities shall include information on the geographical area of responsibility and the official website of the competent authorities.

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[17]　　See ~~Appendix 1.1.~~
[18]　　See ~~Appendix 1.2.~~
[21]　　See ~~Appendix 3.1.~~
[22]　　See ~~Appendix 1.2.~~
[21]　　*Note by the secretariat:* section 5 is deleted.
[22]　　~~The codes provided in this section are in addition to those listed in the IHO S-62 ENC Producer Codes.~~

~~1.   The competent authority for a waterway or a harbour must register itself on the official website of the organizations which have adopted these technical specifications. Details on the name of the authority, its geographical area of responsibility, its official website and other communication possibilities must be given and must be accessible on this website.~~

~~2.   The competent authority for a waterway or a harbour must maintain a list of Inland ENCs which are appropriate for navigation mode within its geographical area of responsibility. The list must include the file name of the cell, the stretch of the inland waterway covered, the edition number, the issue date and a list of available updated files to the currently valid edition, with their issue dates. By putting an Inland ENC on that list, the authority declares this cell as verified concerning the minimum content and therefore appropriate for navigation mode.~~

~~(d)   The lists of competent authorities for waterways or harbours with the above-mentioned details on the official websites of the organizations which have adopted these technical specifications are regarded as digital parts of the Inland ECDIS technical specifications and are named "Competent authorities and geographical responsibilities";~~

(**ed**)[23].

~~(f)   Additional waterway codes can be registered at http://ienc.openecdis.org.~~

Section 3: Presentation Standard for Inland ECDIS

1.   Introduction

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

(b)   This Presentation Standard is based on ~~the IHO document~~ S-52 ~~"Specification for Chart Content and Display Aspects of ECDIS", Edition 6 of March 2010, with all Appendices and~~ Annexes (see "Comparison of the structures of the standard for (Maritime) ECDIS and of the technical specifications for Inland ECDIS" ~~in the preface of these technical specifications~~);

(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** appendix 2, "**Status of the** Presentation Library for Inland ECDIS", to **this annex;**

~~This Presentation Standard comprises:~~

- ~~this Section 3~~

- ~~Appendix 2, Presentation Library for Inland ECDIS, with additions and clarifications to be applied to S-52, Annex A.~~

(e)   Definitions of terms may be found in:

- Part 1, clause 5 of ~~IHO~~ S-57

- IHO Special Publication S-32, Appendix 1

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[23] *Note by the secretariat:* see Informal document SC.3/WP.3 No. 2 (2019).

• the Glossary for Inland ECDIS in section 5 of this annex.

2.   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 ~~will~~ **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 symbolization 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 symbolization 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** also display the features specific to inland navigation. All extensions apply **to** Edition 3.4 of the IHO ECDIS Presentation Library (Annex A ~~of~~ **to former** S-52).

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 <u>library</u> of symbols, line styles and fill styles

- a <u>colour coding scheme</u> which includes the IHO colour tables for day, dusk and night time

- a <u>set of symbology command words</u> from which machine readable instructions can be assembled. The result is a symbology instruction, which is processed to symbolize ENC features in turn

- a <u>set of conditional symbology procedures</u> to decide the appropriate symbolization 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 <u>set of look-up tables</u> that link feature descriptions from the SENC database 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 <u>instruction</u> 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 <u>conditional symbology procedure</u> that selects the appropriate symbology instructions later.

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

- look up tables

- symbol library

- conditional symbology procedures.

~~Only~~ the extensions are described in appendix 2, "**Status of the** Presentation Library for Inland ECDIS", to the present annex.

2.2   Look-up Tables

(no modifications)

2.3 **Conditional Symbology Procedures** *(CS)*

~~Conditional Symbology Procedures~~ (CS) are generated for features of which the symbolization

- 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 must be modified or implemented in an Inland ECDIS additional**ly** to the CS Procedures of S-52**,** are described in appendix 2.~~0~~, "**Status of the** Presentation Library for Inland ECDIS", to this annex.

2.4 **Colours**

Colours used in an ECDIS are defined in an absolute **manner, independently from the** monitor **used** ~~independent way~~ (~~coordinates of the International Commission on Illumination~~ **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 a colour calibration software which must be used by the manufacturer.

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

Due to the fact that various ~~Because of the different~~ lighting 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 **must** be chosen on the basis of ergonomic and physiological factors and the representation of indications in different colours shall not result in mixed colours by ~~overlaying~~ **superimposing**.

2.5 ~~**Representation of Signs**~~ *Presentation of notice marks*

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

Additional 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 ~~sign~~ **notice mark**.

~~Signs~~ **Notice marks** that are located at bridges, must be symbolized according to the orientation of the bridge.

~~Signs~~ **Notice marks** which specify distances or a velocity must not be symbolized 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

(no modifications)

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, ~~to be proven by conformity tests~~ **a type approval is required by the competent authorities [referred to in Annex II of Directive 2016/1629].**

(c) For Inland ECDIS equipment designed for information mode only, the requirements of this section are to be understood as technical (operational and performance) requirements. The producer has to ~~declare~~ **document** the conformity with these technical requirements. A type approval is not required for Inland ECDIS in information mode. The documentation ~~of the conformity tests~~ shall be made available to **the** 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 (section 4B, fig. 1).

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 (section 4B, fig. 2).

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

In this ~~case~~ **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, fig. 3).

This 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

(no modifications)

3.2   Software Performance

(no modifications)

3.3   Performance of Operation Controls

(a)   The operation of the system must 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 must be as low as possible and restricted to the required number;

(c)   Wireless remote controls are not permitted;

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

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

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

3.4   Display Performance

~~For Inland ECDIS in information mode the requirements~~ **The provisions** of chapters 3.4.2 to 3.4.7 are recommendations only **recommended for Inland ECDIS in information mode**.

3.4.1   Display dimensions

(a)   In navigation mode the minimum chart and radar display area must be at least 270 mm x 270 mm;

(b)   In information mode the requirements of subparagraph (c) of chapter 4.1, section 1 shall be ~~fulfilled~~ **applicable.**

3.4.2   Display orientation

(a)   A rectangular display may be mounted in landscape or in portrait orientation under the prerequisite that the ~~above mentioned~~ minimum dimensions set out in **paragraph 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 must be installed preferably in the portrait orientation.

3.4.3   Display resolution

(no modifications)

3.4.4   Display colours

(no modifications)

3.4.5   Display brilliance

The brilliance of the display must be adjustable to every operational required value. This is especially valid for the lowest value during operation ~~in darkness~~ **at night**.

3.4.6   *Picture renewal*

(no modifications)

3.4.7   *Display technology*

~~Preferably,~~ Display systems ~~must be used~~ 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 must provide **for** the possibility ~~to~~ **of** switch**ing** between navigation mode and information mode;

(b)   The operation mode in use must be displayed;

(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 ~~invoking~~ **starting**, the Inland ECDIS equipment ~~must emit~~ **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 must be clearly distinguishable from the chart independently of the chosen colour table;

(b)   Only a monochrome presentation of the actual radar picture is permitted;

(c)   The presentation of chart information must not mask or degrade important parts of the radar picture. This must 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)   ~~In navigation mode,~~ Chart and radar picture presentation must have the same scale;

(e)   The heading line must 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. ~~With~~ **By connection of** a positioning sensor, the displayed part of the chart can automatically follow the mariner's own vessel**'s** position.

4.5   ~~Own Vessel's~~ Position and Bearing **of the own vessel**

(a)   In navigation mode, the own vessel's position must always be visible in the display area, whether "centred" or "off-centred" as specified in ~~the radar requirements of appendix 7 to the annex to Resolution No. 61, revised, "Recommendations on Harmonized Europe-Wide Technical Requirements for Inland Navigation Vessels~~ **Annex 5, Sections I to III of ES-TRIN 2017**;

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

4.6   Information Density

(no modifications)

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 must have fixed range rings with the intervals **set out in subparagraphs (a) and (b)** and at least one variable range marker (VRM);

(d)   Switching on/off of fixed and variable range markers must be independent of each other and their display must 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 realized by a cursor and by a corresponding numerical display, showing the range and bearing of the cursor position.

4.8   Picture Brilliance in Navigation Mode

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

(b)   ~~The~~ Chart and ~~the~~ radar picture must have separate ~~brilliance~~ **brightness** controls;

(c)　　Because of the strongly different environment brightness ~~by~~ **of bright day** and **dark** night, another control for the basic ~~brilliance~~ **brightness** of the display must 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

(no modifications)

4.11　Measurement Features

(no modifications)

4.12　Input and Editing of Skippers' Own Chart Entries

(a)　　Inland ECDIS equipment must allow input, storing, ~~modification~~ **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 must be distinguishable from the SENC data, and must 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 must be possible only outside ~~of~~ the **navigation mode**;

(b)　　**Automatic** updating must not ~~degrade~~ **downgrade** the performance of the navigation display;

(c)　　A rollback function must 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 navigation mode;[24]

(b)　　The dimensions, resolution and attributes of the radar presentation must fulfil the relevant radar requirements;

(c)　　The radar picture must not be degraded by other contents of the picture (see also **subparagraph (c) of** chapter 4.3 ~~(c)~~ of this section);

(d)　　Provided the ~~performance~~ **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 (nearly real-time) and

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[24] On wide inland waterways, Basin Administration may, where appropriate, consider this mandatory requirement as a recommendation.

• the age of information does not exceed the maximum time out values provided in the first table in **subparagraph (e) of chapter** 5.1 ~~(e)~~ of section 1 ~~Performance Standard for Inland ECDIS. For moving vessels~~ The symbols must be marked as outdated if the age of information exceeds 30 seconds **for moving vessels**. The ~~vessel's own~~ position information **of the own vessel shall only** be displayed ~~if it~~ **when the position is detected by an onboard 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 must be faded out at a user-definable range;

(g)   **Only if the heading of other vessels is available,** ~~the presentation of~~ 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 must be used (an octagon is recommended, a circle must be used for inland applications only);

(h)   It must 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 detects that the chart cannot be oriented and/or positioned with the accuracy required by this annex, an alarm must be presented on the display and the chart must 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 must have either ~~their~~ own control elements or ~~their~~ 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 must always be visible:

• actual RANGE

• sensor STATUS (in **navigation mode**: radar tuning, position quality, alarms; in information mode: if connected, ~~GPS~~ **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 unauthorized 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

(no modifications)

5.2 Static Correction of the Chart Orientation

(no modifications)

5.3 Configuration of Interfaces

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

(b)   Interfaces must comply with existing interface specifications ~~like~~ **as defined in IEC 61162** and the interface specifications for rate of turn indicators (20 mV/deg/min) **as defined in IMO Resolution MSC.232(82).**

6. Hardware test and Required Certificates

~~In navigation mode:~~

(a)   The test must 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 must 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 ~~Compatibility with the~~ *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 IEC 60945 **concerning the resistance to** ~~for~~ 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 ~~their~~ **his** representative must submit a relevant conformity declaration ~~by~~ **of** an accredited laboratory.

6.2 Equipment Documentation

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

6.3 Interfaces

(a)   All interfaces must be ~~correctly and completely~~ documented **correctly and completely**;

(b)   Electronic circuits must be ~~of failsafe design~~ **designed failsafe**, mechanically ~~and~~ **as well as** electronically, and must not have degrading repercussions on connected equipment.

6.4   Characteristic of Operation Controls

(no modifications)

6.5   Characteristic of the Display in Navigation Mode

(no modifications)

7.   Test of the Chart Presentation, Operation and Functionality

7.1   Preparation of the Equipment Under Test (EUT)

(no modifications)

7.2   Test of the Operation Modes

All operating modes as described in the operating manual must be successively ~~invoked~~ **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 visibility and correct display~~. For this test, the information density must be switched to "all features". The system must be capable ~~of~~ **to** at least display~~ing~~ 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 appendix 2 "Status of **the** Presentation Library for Inland ECDIS" to this annex, are used for the presentation of any chart information, **then** they must:

- 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 must 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 ~~for correct installation~~;

(b)   For this test, the range **must be used** at which the feature ~~is~~ **must be** visible according to its SCAMIN enumeration (refer **to chapter 8.4 of** appendix 1~~.1~~, "~~Inland ENC Feature Catalogue~~ **Product Specification for Inland ENCs**", **including appendices 1.1 "IENC Feature Catalogue"' and 1.2 "Inland Electronic Navigational Chart Encoding Guide"**)~~and S-52, Annex A, IHO ECDIS Presentation Library, Appendix 2, Part I, Users' Manual, Section 8.4) must be used~~.

7.5 Test of Brilliance Variation in Navigation Mode

The Inland ECDIS equipment must be operated in a dark room ~~with~~ **and** the brilliance ~~at~~ **must be brought to** its lowest level. The brilliance of the features must 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

(no modifications)

7.7 Test of the Measurement Functions

(no modifications)

7.8 Test of the Chart Update Function

(no modifications)

7.9 Test of Displayed Features in More than One Cell for the Same Area

(a) **It must be tested whether** all features included in the test SENC and in the additional overlay test SENC ~~must be tested for visibility~~ **are visible** and correct displayed. For this test, the information density must be switched to "all ~~display~~ features".;

(b) **It must be tested whether it is possible** ~~The possibility~~ 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 ~~must be tested~~;

(c) It must be tested whether the test bathymetric Inland ENC is displayed correctly together with the base SENC in accordance with chapter 6 of appendix 2, **"Status of the Presentation Library for Inland ECDIS" to this annex.**

8. Test of Radar Picture Presentation and Operation in Navigation Mode

8.1 Preparations

(no modifications)

8.2 Test of the Radar Picture without *U*~~u~~nder 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 must be considered as the "daughter display" of an item of radar equipment. In that case, the radar picture must fulfil <u>the display and picture-relevant requirements</u> of the requirements for radar and rate-of-turn indicators **as defined in Sections I to III of ES-TRIN 2017;**

(b) If the EUT is a radar installation with integrated Inland ECDIS functionality (See section 4B, fig. 4), <u>all requirements</u> of the standards for radar equipment and rate-of-turn indicators **as defined in the document referred to in Sections I to III of ES-TRIN 2017** shall be fulfilled.

8.3 Test of the Radar Picture, Overlaid Information from Other Vessels and the Underlying Chart

(no modifications)

8.3.1   *Test of the radar overlay*

(a)   The radar image must not be degraded by the chart picture (**refer to subparagraph (c) of chapter** 4.3 ~~(e)~~ of this section);

(b)   The overlay of information regarding the position and orientation of other vessels must be displayed only 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 **subparagraph (e) of chapter** 5.1 ~~(e)~~ of section 1 **of this annex**. The symbols must be marked as outdated if the age of the information exceeds 30 seconds for moving vessels. The position information of the own vessel must not be displayed if it is received from a repeater station;

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

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

- a directed triangle; or

- a true outline (to scale).

~~must be displayed only when the heading of these other vessels is available~~. For all other vessels a generic symbol must be used (**an octagon** ~~square~~ is recommended, a circle must be used for inland applications only);

(e)   It must 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 must 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 must 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 **must** be less than ± 0.5 degree;

(c)   The correction of these parameters **referred to in subparagraphs (a) and (b)** must be demonstrated in the service mode;

(d)   The dynamic deviation of the chart orientation at rates of turn less than ± 60 deg./min must be less than ± 3 degrees;

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

8.3.3   *Test of scale conformity*

(no modifications)

9. Test of Alarms and Indications

(a)   The alarms generated from Inland ECDIS equipment itself as well as the passed alarms delivered ~~by the connected sensors~~ to the ECDIS **by the connected sensors** must 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

(no modifications)

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.

~~The~~ Requirements ~~of~~ 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.**

1.1   Software Design Requirements

(no modifications)

1.2   Implementation Requirements

(no modifications)

1.3 Test Requirements

(no modifications)

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 must be chosen according to the general safety requirements. The navigation system provider must 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 must 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 must reapply for type approval which will check **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) must contain comprehensive information on **the** equipment, the installation, **the** operation and **the** service of the navigation system. The presentation of user-relevant information must be made clear, understandable and without unnecessary technical terms. The user manual must **at least** be available in English, French, German and Dutch. The technical documentation may be made available in English only.

2. Methods of Testing and Required Test Results

2.1 Navigation Mode Operation Test

2.1.1 Performance Requirements

(no modifications)

2.1.1.1 Position

(no modifications)

2.1.1.2   Heading

(no modifications)

2.1.2   *Sensor Failure*

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

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

2.1.3   *Performance Test Interface*

A navigation system provider must 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 must be encoded by IEC 61162-1 sentences (see **IEC 60945)** 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.

These strings must be sent preferably every 0,1 second, at least every second. Position and heading must be according to the definitions in chapters 2.1.1.1 and 2.1.1.2 of this section.

2.2   General Software Tests

2.2.1   *Equipment Documentation*

The following documents must be provided for admittance and must be shipped with **every Inland ECDIS used in** navigation ~~system~~ **mode**:

- User**'s** manual

- Installation manual

- Service manual.

The following documents and files must 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 must allow for a complete verification of compliance with ~~these technical specifications~~ **this annex**.

A user's manual must be shipped with every **Inland ECDIS** ~~information mode~~ system.

2.2.2   *Endurance Test* **for navigation mode**

(no modifications)

3. Changes to Certified *Navigation* Systems

3.1 General Requirements

(no modifications)

3.2 Hardware and Software Changes

The navigation system provider may change software or hardware as long as Inland ECDIS compliance is maintained. Changes must be fully documented and submitted to the competent authority, together with an explanation of how the navigation system is affected by these changes. The competent authority may ~~request~~ **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.

Section 4B: System Configurations (Figures)[25]

Figure 1

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

Figure 2

Inland ECDIS equipment, *parallel installation* ~~self-sufficient system~~ with connection to radar (*system configuration 2*)

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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[25] *Note by the secretariat*: the figures are not modified and are not reproduced here.