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Responsible committee: EPL/80 Maritime navigation and radiocommunication equipment and systems

Interested committees:

Title: BS EN IEC 61174 Maritime navigation and radiocommunication equipment and systems - Elec tronic chart display and information system (ECDIS) - Operational and pe rformance requirements, methods of testing and required test results

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



80/1124/CD

COMMITTEE DRAFT (CD)

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SECRETARIAT:

United Kingdom

SECRETARY:

Mr Kim Fisher

OF INTEREST TO THE FOLLOWING COMMITTEES:

HORIZONTAL FUNCTION(S):

ASPECTS CONCERNED:

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TITLE:

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

NOTE FROM TC/SC OFFICERS:

This draft has been prepared by MT7 subsequent to comments received on the previous 80/1107/CD.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**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**

FOREWORD

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International Standard IEC 61174 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

This fifth edition of IEC 61174 cancels and replaces the fourth edition published in 2015, of which it constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- Compliance with IMO revised Performance Standards for ECDIS, MSC.530(106).
- Compliance with IMO revised Performance Standards for Presentation of navigational information, MSC.191(79) as amended by MSC.466(101), see IEC 62288.

- Compliance with BAM has been moved from IEC 61924-2 to IEC 62923-1 and IEC 62923-2.
- Introduction of S-100 based critical framework includes IHO S-98, IHO S-100, IHO S-128 and IHO S-164.
- Introduction of S-100 based product specifications for nautical charts and nautical publications. The IHO plan for the initial set for compliance includes IHO S-101, IHO S-102, IHO S-104, IHO S-111, IHO S-124 and IHO S-129.
- Functionality of the optional AIS interface has been aligned with IEC 62288.
- Revision of RTZ format, version 1.2, for transfer of route plans from PAS IEC 61174-1:2021.
- New alternative format for transfer of route plans, IEC 63173-1 (S-421).

The text of this standard is based on the following documents:

FDIS	Report on voting
80/761/FDIS	80/767/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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

1 Scope

This International Standard specifies the performance requirements, methods of testing and required test results of equipment conforming to performance standards not inferior to those adopted by the IMO in resolution MSC.530(106).

This standard is based upon the performance standards of IMO resolution MSC.530(106), and is also associated with IMO resolution A.694(17) and IEC 60945. Reference is made, where appropriate, to IMO resolution MSC.191(79) and MSC.530(106), and all subclauses whose wording is identical to that in the resolution are printed in italics.

In association with the above IMO resolution MSC.530(106), are the International Hydrographic Organization (IHO) publications¹. IHO S-32, IHO S-52, IHO S-57, IHO S-61, IHO S-63, IHO S-64, S-98, S-100, S-101, S-102, S-104, S-111, S-124, S-128, 129 and S-164. This standard has included extracts from the above publications where they are applicable to this equipment. Where reference is made, all subclauses whose wording is identical to that in the publications, are printed in italics.

(530/A2.1) These performance standards should apply to all ECDIS equipment carried on all ships as follows:

- *dedicated standalone workstation.*
- *a multifunction workstation as part of an INS.*

(530/A2.2) These performance standards apply to ECDIS mode of operation, ECDIS in RCDS mode of operation as specified in Annex G and ECDIS backup arrangements as specified in Annex F.

(530/A2.3) Requirements for structure, format, encryption and presentation of the ENDS are within the scope of relevant IHO standards, including those listed in the normative references.

The requirements of this standard are not intended to prevent the use of new techniques in equipment and systems, provided the facilities offered are not inferior to those stated.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60945, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

¹ IHO publications are available from <http://www.iho.int>, together with any supplementary information.

- 531 IEC 61162-1, *Maritime navigation and radiocommunication equipment and systems – Digital*
532 *interfaces – Part 1: Single talker and multiple listeners*
- 533 IEC 61162-450, *Maritime navigation and radiocommunication equipment and systems –*
534 *Digital interfaces – Part 450: Multiple talkers and multiple listeners – Ethernet interconnection*
- 535 IEC 61996-1:2021, *Maritime navigation and radiocommunication equipment and systems –*
536 *Shipborne voyage data recorder (VDR) – Part 1: Performance requirements, methods of*
537 *testing and required test results*
- 538 IEC 62288:2021, *Maritime navigation and radiocommunication equipment and systems –*
539 *Presentation of navigation-related information on shipborne navigational displays – General*
540 *requirements – Methods of testing and required test results*
- 541 IEC 62388:2013, *Maritime navigation and radiocommunication equipment and systems –*
542 *Shipborne radar – Performance requirements – Methods of testing and required test results*
- 543 IEC 62923-1 *Maritime navigation and radiocommunication equipment and systems – Bridge*
544 *alert management – Part1: Operational and performance requirements, methods of testing*
545 *and required test results*
- 546 IEC 62923-2 *Maritime navigation and radiocommunication equipment and systems – Bridge*
547 *alert management – Part2: Alert and cluster identifiers and other additional features*
- 548 IEC 63173-1 *Maritime navigation and radiocommunication equipment and systems – Data*
549 *interfaces – Part1: S-421 route plan based on S-100*
- 550 IEC 63173-2 *Maritime navigation and radiocommunication equipment and systems – Data*
551 *interfaces – Part2: Secure Communication Between Ship and Shore*
- 552 ISO 8601 series, *Data elements and interchange formats – Information interchange –*
553 *Representation of dates and times*
- 554 IHO M-3:2007, *Resolutions of the IHO, Chapter A, Section 3, Technical Resolution 3.11*
- 555 IHO S-52:2014, *Specifications for chart content and display aspects of ECDIS edition 6.1*
- 556 IHO S-52, appendix 1:2012, *Guidance on Updating the Electronic Navigational Chart*
557 *edition 4.0*
- 558 IHO S-52, Annex A:2014, *Presentation library edition 4.0*
- 559 IHO S-57, *IHO transfer standard for digital hydrographic data*
- 560 IHO S-57, appendix B.1, *ENC product specification*
- 561 IHO S-61:1999, *Product specification for raster navigational charts (RNC)*
- 562 IHO S-63, *IHO data protection scheme*
- 563 IHO S-64, *Test data sets for ECDIS*
- 564 IHO S-98, *Data Product Interoperability in S-100 Navigation Systems*
- 565 IHO S-164, *IHO Test Data Sets in ECDIS - Instruction Manual for the Use of IHO Test Data*
566 *Sets in ECDIS*

IMO, *International Convention for the safety of life at sea (SOLAS) 1974 (as amended)*

IMO A.694(17):1991, *General requirements for shipborne radio equipment forming part of the global maritime distress and safety system (GMDSS) and for electronic navigational aids*

IMO MSC.191(79):2004, *Performance standards for the presentation of navigation-related information on shipborne navigational displays*

IMO MSC.530(106):2022, *Revised Performance standards for electronic chart display and information systems (ECDIS)*

IMO MSC/Circ.982:2000, *Guidelines on ergonomic criteria for bridge equipment and layout*

IMO SN.1/Circ.266:2007, *Maintenance of electronic chart display and information system (ECDIS) software*

3 Terms, definitions and abbreviations

For the purposes of this document, the terms, definitions and abbreviations given in IEC 62288, as well as the following apply.

3.1 Terms and definitions

3.1.1

activated AIS target

(MSC.191/A) *target representing the automatic or manual activation of a sleeping for the display of additional graphically presented information*

3.1.2

appropriate portfolio of up to date paper charts

APC

a suite of paper charts of a scale to show sufficient detail of topography, depths, navigational hazards, aids to navigation, charted routes, and routing measures to provide the mariner with information on the overall navigational environment

[SOURCE: IMO Resolution MSC.530(106):2022, Appendix 7]

3.1.3

CIE colour calibration

colour calibration at the monitor performed to transform the CIE-specified colours for ECDIS into the colour coordinate system of the screen

Note 1 to entry: This confirms that the colours specified in IHO S-52, Annex A are correctly reproduced on the ECDIS display.

[SOURCE: IHO S-32]

3.1.4

common reference system

means provided to assure that when navigational information from sensors and other information sources when displayed together with charted information use same horizontal and vertical datum

3.1.5

dangerous target

(MSC.191/A) *tracked radar or reported AIS target with a predicted CPA and TCPA that violates values preset by the user.*

608 Note 1 to entry: *The respective target is marked by a “dangerous target” symbol.*

609 [SOURCE: IEC 62288]

610 **3.1.6**

611 **dead-reckoned position**

612 **DR**

613 position extrapolated from the last accepted position update, based on present course and
614 speed, and updated on a time interval

615 [SOURCE: IEC 62288]

616 **3.1.7**

617 **display base**

618 *the chart content as listed in Annex A and which cannot be removed from the display.*

619 Note 1 to entry: *It is not intended to be sufficient for safe navigation*

620 [SOURCE: IMO Resolution MSC.530(106):2022, clause A3.6]

621 **3.1.8**

622 **display scale**

623 ratio between a distance on the display and a distance on the ground

624 Note 1 to entry: This ratio is normalized and expressed as, for example 1:10 000.

625 **3.1.9**

626 **electronic chart display and information system**

627 **ECDIS**

628 *navigation information system which with adequate backup arrangements can be accepted as*
629 *complying with the up-to-date chart and nautical publications required by SOLAS regulation*
630 *V/19 and V/27, by displaying selected information from a system database with positional*
631 *information from navigation sensors to assist the mariner in route planning and route*
632 *monitoring, and if required display additional navigation-related information*

633 [SOURCE: IMO Resolution MSC.530(106):2022, clause A3.1]

634 **3.1.10**

635 **Enhanced Group Call**

636 **EGC**

637 maritime mobile satellite message service specified by IMO as a possible part of Global
638 Maritime Distress and Safety System (GMDSS)

639 Note 1 to entry: For example message services provided by Inmarsat SafetyNET (IEC 61097-4), Iridium
640 SafetyCast (IEC 61097-16).

641 **3.1.11**

642 **electronic navigational chart**

643 **ENC**

644 *the database, standardized as to content, structure and format, issued for use with ECDIS by*
645 *or on the authority of a government authorized hydrographic office or other relevant*
646 *government institution, and conforming to IHO standards. The ENC contains all the nautical*
647 *chart information necessary for safe navigation.*

648 [SOURCE: IMO Resolution MSC.530(106):2022, clause A3.2]

649 **3.1.12**

650 **ENC cell**

651 *the basic unit of ENC data covering a defined geographical area bounded by two meridians*
652 *and two parallels*

653 [SOURCE: IHO S-32]

654 **3.1.13**

655 **ENC data**

656 data conforming to 3.1.11

657 **3.1.14**

658 **test data set**

659 standardized data set and testing instructions available as IHO S-64 and S-164

660 **3.1.15**

661 **electronic navigational data service**

662 **ENDS**

663 *a special-purpose database compiled from nautical chart and nautical publication data,*
664 *standardized as to content, structure and format, issued for use with ECDIS by or on the*
665 *authority of a Government, authorized hydrographic office or other relevant government*
666 *institution, and conforming to IHO standards; and, which is designed to meet the requirement*
667 *of marine navigation and the nautical charts and nautical publications carriage requirements*
668 *in SOLAS regulations V/19 and V/27. The navigational base layer of ENDS is the electronic*
669 *navigational chart (ENC).*

670 [SOURCE: IMO Resolution MSC.530(106):2022, clause A3.3]

671 **3.1.16**

672 **estimated position**

673 **EP**

674 position extrapolated from the last accepted position update, based on present course and
675 speed (STW), including effects of wind, tide, current, and updated on a time interval

676 [SOURCE: IEC 62288]

677 **3.1.17**

678 **fix**

679 position of own ship determined, without reference to any former position

680 [SOURCE: IEC 62288]

681 **3.1.18**

682 **line of position**

683 **LOP**

684 plotted line on which own ship is located determined by observation or measurement of the
685 range or bearing to an aid to navigation or other charted element

686 [SOURCE: IEC 62288:2021, 3.1.35]

687 **3.1.19**

688 **lost target**

689 (MSC.191/A) tracked radar or reported *target* for which the system is no longer receiving *valid*
690 *position* data

691 Note 1 to entry: The target is *represened* by a "lost target" symbol.

692 [SOURCE: IEC 62288]

693 **3.1.20**

694 **non-ENC data**

695 data not conforming to 3.1.11

3.1.21**non-HO source**

database containing chart information for navigation similar to ENC but the source is not recognized as government authorized Hydrographic Office or other relevant government institution

Note 1 to entry: For government authorized Hydrographic Office or other relevant government institution, see IHO S-62 chapter I. IHO Member states and chapter II. Other States.

3.1.22**official**

by, or on authority of a government, authorized Hydrographic Office or other relevant government institution

3.1.23**overscale**

display of the chart information at a display scale specified by the IHO as overscale

Note 1 to entry: Overscaling may arise from deliberate overscaling by the mariner, or from automatic overscaling by ECDIS in compiling a display.

3.1.24**permanent indication**

indication that is displayed visually and continuously and cannot be removed from the display other than by eliminating the cause of the indication

3.1.25**readily available**

at any moment, immediately displayed by a single operator action

3.1.26**presentation library**

implementation of the display specifications in IHO S-52, Annex A, by de-coding and symbolizing the S-57 ENC data

3.1.27**raster chart display system****RCDS**

a navigation information system displaying RNCs with positional information from navigation sensors to assist the mariner in route planning and route monitoring and, if required, display additional navigation-related information

[SOURCE: IMO Resolution MSC.530(106):2022, Appendix 7 3.1]

3.1.28**raster navigational chart****RNC**

a facsimile of a paper chart originated by, or distributed on the authority of, a government-authorized Hydrographic Office

Note 1 to entry: *RNC is used in these standards to mean either a single chart or a collection of charts.*

[SOURCE: IMO Resolution MSC.530(106):2022, Appendix 7 3.2]

3.1.29**RTS**

Reported Target Simulator as defined in Annex F of IEC 62388:2013

3.1.30**route**

series of waypoints connected by one or more legs including both straight and curved segments

3.1.31**RNC data**

data conforming to 3.1.27

3.1.32**RNC test data set**

standardized data set and testing instructions available as IHO S-64

3.1.33**safety contour**

borderline between safe and unsafe water based on depth defined by the mariner

Note 1 to entry: The safety contour includes, for example, the ships draft plus under keel clearance.

3.1.34**safety depth**

depth defined by the mariner, e.g. the ships draft plus under keel clearance, to be used by ECDIS to emphasise sounding on the display equal to or less than this value

[SOURCE: IHO S-32]

3.1.35**selected target**

(MSC.191/A) target selected manually or automatically for the display of detailed alphanumeric data, information and text in a separate user dialogue area.

Note 1 to entry: The target is represented by a "selected target" symbol

[SOURCE: IEC 62288]

3.1.36**single operator action**

(MSC.252/A1) procedure achieved by no more than one hard-key or soft-key action, excluding any necessary cursor movements, or voice actuation using programmed codes

3.1.37**sleeping AIS target**

(MSC.191/A) AIS target indicating the presence of a vessel equipped with AIS in a certain location.

Note 1 to entry: The target is represented by a "sleeping target" symbol indicating the vessel's orientation. No additional information is presented until the AIS target is activated

[SOURCE: IEC 62288]

3.1.38**standard display**

the display mode intended to be used as a minimum during route planning and route monitoring

Note 1 to entry: The chart content is listed in Annex A.

[SOURCE: IMO Resolution MSC.530(106):2022, clause A3.5]

3.1.39**system database**

a database in the manufacturer's internal ECDIS format, resulting from the lossless transformation of the entire ENDS contents and updates

Note 1 to entry: *It is this database that is actually accessed by ECDIS for the display generation and other navigational functions, and is the equivalent of an up-to-date ENDS.*

[SOURCE: IMO Resolution MSC.530(106):2022, clause A3.4]

3.1.40**system raster navigational chart****SRNC**

a database resulting from the transformation of the RNC by the RCDS to include updates to the RNC by appropriate means

[SOURCE: IMO Resolution MSC.530(106):2022, Appendix 7 3.4]

3.1.41**tracked radar target**

object, fixed or moving, which is tracked by radar or target tracking function

[SOURCE: IEC 62288]

3.2 Abbreviations

AIS	Automatic Identification System
ASM	Application Specific Message
BAM	Bridge Alert Management
BNWAS	Bridge Navigational Watch Alarm System
CAM	Central Alert Management
CCRP	Consistent Common Reference Point
CIE	International Commission on Illumination
COG	Course Over Ground
DAC	Designated Area Code
EBL	Electronic Bearing Line
ECDIS	Electronic Chart Display
EP	Estimated Position
EPFS	Electronic Position-Fixing System
EUT	Equipment Under Test
FI	Function Indicator
GMDSS	Global Maritime Distress And Safety System
HO	Hydrographic Office
IHO	International Hydrographic Organization
IMO	International Maritime Organization
ISO	International Organization for Standardization
LAN	Local Area Network
MMSI	Maritime Mobile Service Identity
MSI	Maritime Safety Information
ROT	Rate Of Turn

824	SOG	Speed Over Ground
825	SOLAS	International Convention for the Safety of Life at Sea (SOLAS), 1974 as amended
826	TT	Target Tracking
827	USB	Universal Serial Bus
828	URI	Uniform Resource Identifier
829	VDL	AIS VHF Data Link
830	VDM	AIS VHF Data link Message
831	VDR	Voyage Data Recorder
832	VRM	Variable Range Marker

833 **4 Minimum operational and performance requirements**

834 **4.1 General**

835 *(530/A1.1) The primary function of the ECDIS is to contribute to safe navigation.*

836 *(530/A1.2) ECDIS with adequate back-up arrangements may be accepted as complying with*
837 *the up-to-date charts and nautical publications required by regulations V/19 and V/27 of the*
838 *1974 SOLAS Convention. (See Annex F.). For the purpose of this document, the definition of*
839 *electronic navigational data service (ENDS) encompasses the nautical charts and nautical*
840 *publications as defined in SOLAS chapter V and IHO standards in force*

841 *(530/A2.4) In addition to the general requirements set out in resolution A.694(17) as further*
842 *specified in IEC 60945 and the presentation requirements set out in resolution MSC.191(79)*
843 *as further specified in IEC 62288, ECDIS equipment shall meet the requirements of*
844 *MSC.530(106) and follow the relevant guidelines on ergonomic principles adopted by the IMO*
845 *in MSC/Circ.982. (See 5.3, 8.3, 8.9.1)*

846 *(530/A1.3) ECDIS shall be capable of displaying all nautical information necessary for safe*
847 *and efficient navigation originated and distributed by or on the authority of, government*
848 *authorized hydrographic office or other relevant government institution, as required by SOLAS*
849 *regulations V/19 and V/27. (See 4.3, Clause 5)*

850 *(530/A1.4) ECDIS shall facilitate simple and reliable updating of the ENDS. (See 4.4, 5.9)*

851 *(530/A1.5) ECDIS shall reduce the navigational workload compared to using the paper chart*
852 *and paper nautical publications. It shall enable the mariner to execute in a convenient and*
853 *timely manner all route planning, route monitoring and positioning. It shall be capable of*
854 *continuously indicating, monitoring and recording the ship's position. (See 4.10)*

855 *(530/A1.7) ECDIS shall provide appropriate alerts or indications with respect to the*
856 *information displayed or malfunction of the equipment. (See Annex D). ECDIS shall meet the*
857 *requirements of the performance standards for bridge alert management (resolution*
858 *MSC.302(87)) (See 4.12.2).*

859 ECDIS shall comply with the requirements of IEC 62923-1 and IEC 62923-2.

860 NOTE This document does not mandate denying responsibility transfer.

861 *(530/A1.8) When the relevant chart information is not available in the appropriate form, (See*
862 *4.4) some ECDIS equipment may operate in the Raster Chart Display System (RCDS) mode*
863 *as defined in Annex G. RCDS mode of operation shall conform to performance standards not*
864 *inferior to those set out in Annex G.*

(530/A1.6) *The ECDIS display may also be used for the display of radar, radar tracked target information, AIS and other appropriate data layers to assist in route monitoring in accordance with requirements of 530/A2.4, 530/A7.4, and 530/A9.2, as further specified herein. (See 4.6, 4.8, 4.12)*

4.2 ECDIS definitions

(530/A3.7) *Further information on ECDIS definitions may be found in IHO S-32.*

4.3 Display of system database information

4.3.1 System database

(530/A5.1a) *An ECDIS shall be capable of accepting and converting an ENDS and their updates into a system database. ECDIS shall be capable of displaying and processing all system database information as specified by IHO.*

NOTE IHO has informed that the minimum capability to accept and convert is specified by IHO S-57/S-63 and S-98 and tested by IHO S-64 and S-164.

(530/A5.1b) *The ECDIS may also be capable of accepting a system database resulting from conversion ashore, in accordance with IHO resolutions (IHO Publication M-3).*

For ENDS data delivered in system database format, the chart update mechanism provided by the ECDIS shall not be inferior to the ENDS update mechanism. (See 4.4)

4.3.2 Indication about use of non-HO source

(See 8.5.3)

If system database data from a non-HO source is in use, a permanent indication of “unofficial data” shall be provided.

For S-57 ENC charts IHO maintains a list of Data producer Codes (DPCs) in S-62 and recommends that ECDIS manufacturers keep the DPCs up to date in the ECDIS. The operating manuals shall describe how this can be achieved. The user interface shall indicate the date of the DPCs implemented.

For S-100 Products the source of DPCs is machine-readable IHO [TBD].

4.3.3 Categories of display

(See 8.8.2 to 8.8.6)

(530/A5.2) *System database information available for display during route planning and route monitoring shall be subdivided into the following three categories, Display base, Standard display and All Other Information. (See Annex A and Annex M)*

(530/A5.3) *ECDIS shall present the Standard Display at any time by a single operator action.*

Selection of Standard display shall not change any user setting other than selection of viewing groups for the display of ENDS data. When Standard Display is selected, all viewing groups of that category shall be visible in the chart display and additional viewing groups of All Other Information shall not be visible in the chart display.

(530/A5.5) *It shall be easy to add or remove information from the ECDIS display. It shall not be possible to remove information contained in the Display Base.*

Each IMO information category is divided into sub-classes called viewing group layers and viewing groups as specified in Annex M. The details of viewing group layers and subsets of viewing groups within each layer are available in Annex M.

ECDIS shall provide means to add or remove information from the display by selection of any of the viewing group layers except those of the Display Base.

Any additional selection capability that may be provided shall be described in the user manual and shall be derived from the viewing group layers and viewing groups specified in Annex M.

The association of multiple viewing groups from different viewing group layers may be combined into an additional selection. However, the selection of viewing group layers and viewing groups of the Standard display category shall not be combined with those unique to the All Other Information category.

More detailed chart display control selectors than those based on viewing group layers may be provided but the addition or removal of information shall be limited to individual IHO viewing groups (for example "Soundings" from the viewing group layer "Depth, currents, etc." could be provided as a selection) not selection of individual items, for example an individual area or an individual sounding.

Text shall only be displayed when the object it applies to is displayed. The display of text shall be controlled independently of the display of the object it applies to. The mariner shall have full control over the display of text. All text is in the Category *"All other Information"*.

NOTE 1 For S-57 the text group layers specified in Annex M are intended as a framework on which the ECDIS manufacturers can base their own method of providing this capability. Each text group layer is divided into sub-classes called text groups. The details of text group layers and subsets of text groups within each layer are specified in Annex M.

NOTE 2 For S-100 products the text group layers are available in the related portrayal catalogues as context parameters.

For S-57, ECDIS shall provide at least the capability to select "Important Text" and "Other Text", and ECDIS may provide further text groupings.

Such further text group selectors shall be a subset of the parent text group layer (for example "Geographic names" from text group layer "Other text" could be provided with a dedicated display selector). ECDIS may provide also combined text display control selectors, but such selectors can only combine text groups from the same text group layer (i.e. it is not allowed to combine text groups from both "Important Text" and "Other Text" text group layers).

NOTE 3 As a guide for organizing the display of text, the last two digits of the S-52 SHOWTEXT instruction give a text classification that distinguishes between "Important" and "Other" text, and gives further suggested text groupings.

National text is a supplementary option for ECDIS. If provided, the style shall be similar to that of the non-National text.

(530/A5.4) When an ECDIS is switched on following a switch off or power failure, it shall return to the most recent manually selected settings for display.

4.3.4 Safety contour

(See 8.8.11, 8.9.2, 8.9.4)

(530/A5.8) It shall be possible for the mariner to select a safety contour from the information provided by the system database. ECDIS shall emphasize the safety contour over other contours on the display, however:

- a) *if the mariner does not specify a safety contour, this shall default to 30 m. If the safety contour specified by the mariner or the default 30 m contour is not in the displayed system database, the safety contour shown shall default to the next deeper contour;*
- b) *if the safety contour in use becomes unavailable due to a change in source data, the safety contour shall default to the next deeper contour; and;*
- c) *in each of the above cases, an indication shall be provided;*
- d) *the mariner shall be able to select a permanent display of safety contour and safety depth settings (values).*

NOTE In an area for which both S-101 and S-102 data are available the user can select to derive the safety contour from gridded depth information in S-102 as described in S-98: TBD Annex C Appendix C 4.

NOTE More information about usage of safety contour and safety depth is available in informative Annex N.

4.3.5 Safety depth

(See 8.8.12)

(530/A5.9) *It shall be possible for the mariner to select a safety depth. ECDIS shall emphasize soundings equal to or less than the safety depth whenever spot soundings are selected for display.*

4.3.6 Dynamic water level

(See 8.8.21)

(530/A5.10) *It shall be possible to use dynamic water level adjustment and, when in use, an indication as specified in IHO S-98 shall be provided.*

NOTE One aspect of dynamic water level is a result of applying S-104 water level information to S-102 bathymetry. The S-102 bathymetry can replace depth area information of S-101 ENC chart. Another aspect dynamic water level is a result of applying S-104 water level information to some feature objects of S-101. This functionality is applicable only when S-102 Bathymetry layer is not available. Testing of this functionality is included in S-164.

4.3.7 Information content

(530/A5.11) *The ENDS and all updates to it shall be displayed without any degradation of their information content.*

Degradation means reduction in information quantity as well as quality with respect to the IHO S-64 and S-164 test data set.

4.3.8 Verification and updates

(See 8.8.8, 8.8.18.2)

(530/A5.12) *ECDIS shall provide a means to ensure that the ENDS and all updates to it have been correctly loaded into the system database.*

(530/A5.13) *The ENDS data and updates to it shall be clearly distinguishable from other displayed information, including those listed in Annex B.*

4.3.9 Information about chart objects

(530/A5.6) *For any operator identified geographical position (for example by cursor picking) ECDIS shall display on demand the information about the chart objects associated with such a position. (See 5.3.1)*

4.3.10 Display scale

(530/A5.7) *It shall be possible to change the display scale by appropriate steps for example by means of either chart scale values or ranges in nautical miles. (See 5.2.1)*

4.4 Provision and updating of ENDS information

4.4.1 Contents of the system database

(See 8.5.3)

(530/A4.1) The ENDS information to be used in ECDIS shall be issued by or on the authority of a Government, government-authorized Hydrographic Office or other relevant government institution, and conform to IHO standards.

In order to identify the date and origin of the ENDS in use, the ECDIS shall include a graphical index of ENDS data available, presented upon the mariner's request and providing access to the edition and date of each cell. (See 4.3.8 and 5.2.1)

A new edition of an ENDS shall supersede a previous ENDS and its integrated updates issued by a government authorized Hydrographic Office or other relevant government institution.

(530/A4.2) The contents of the system database shall be adequate and up-to-date for the intended voyage to comply with SOLAS regulation V/27.

(530/A4.3) It shall not be possible to alter the contents of the ENDS or system database information transformed from the ENDS. The display of the content of the ENDS shall be compliant with IHO standards including rules set for interoperability.

4.4.2 Updates

(See 8.5.4, 8.8.18, 8.8.19)

(530/A4.4) ECDIS shall be capable of accepting official updates to the ENDS provided in conformity with IHO standards. These updates shall be automatically applied to the system database. By whatever means updates are received, the implementation procedure shall not interfere with the display in use.

The contents of an update assume that all earlier updates have been applied to the system database.

(530/A4.5) ECDIS shall also be capable of accepting updates to the ENDS data entered manually with simple means for verification prior to the final acceptance of the data. They shall be distinguishable on the display from ENDS information and its official updates and not affect display legibility.

(530/A4.6) ECDIS shall keep and display on demand a record of updates including time of application to the system database. This record shall include updates for each ENDS until it is superseded by a new edition.

(530/A4.7) ECDIS shall allow the mariner to display updates in order to review their contents and to ascertain that they have been included in the system database.

(S-52/10.7.2) On mariner's demand automatic chart corrections of ENC information shall be highlighted in accordance with IHO S-52/10.7.2.

(530/A4.8) ECDIS shall be capable of accepting ENDS in accordance with the IHO Data Protection Scheme (IHO Publication S-63 – Data Protection Scheme (for S-57 ENCs) and S-100, Part 15 – Data Protection Scheme (for S-100 products).

NOTE Non-encrypted ENCs can be available in plain IHO S-57 format or in accordance with the IHO S-63.

Means shall be provided for a full ENC Update Status Report in accordance with IHO S-63 and for a full ENC Update Status Report in accordance with S-98. Optionally means may be

1030 provided for Route Filtered ENC Update Status Report in accordance with IHO S-63 or S-98.
1031 Optionally means may be provided for an ENC Management Report in accordance with the
1032 IHO S-63 or S-98. (See Annex L). If support for electronic nautical publications (ENP) is
1033 provided, the ECDIS shall provide the related ENP Update Status Reports in accordance with
1034 S-98.

1035 NOTE The IHO determines whether support for ENPs is mandatory

1036 **4.5 Scale**

1037 (See 8.8.9)

1038 (530/A6.1) *ECDIS shall provide a permanent indication if:*

- 1039 a) *the information is displayed at a larger scale than that contained in the ENC; or*
1040 b) *own ship's position is covered by an ENC at a larger scale than that provided by the*
1041 *display.*
1042 c) *information at own ship's position is not displayed because of applying scale minimum*
1043 *for display.*

1044 Means shall be provided that by a simple operator action an operator can set the display
1045 scale to the original scale (see IEC 62288) i.e. compilation scale for S-57 charts and optimum
1046 display scale for S-101 charts of the ENC currently displayed at own ship's position. If own
1047 ship is not currently in the display area, the scale shall be set to the original scale (see IEC
1048 62288) i.e. compilation scale for S-57 charts and optimum display scale for S-101 charts of the
1049 ENC currently displayed at the centre point of the display area.

1050 **4.6 Display of other navigational information**

1051 **4.6.1 General for all overlays**

1052 (See 8.8.16, 8.8.14)

1053 (530/A7.1) *Radar information and/or AIS information may only be transferred from systems*
1054 *compliant with the relevant standards of IMO. Other navigational information may be added to*
1055 *the ECDIS display. However, it shall not degrade the displayed system database information,*
1056 *and it shall be clearly distinguishable from the system database information. (See also*
1057 *IEC 62288:2021, 6.3.3 and 6.3.8).*

1058 NOTE Above relevant standard of IMO means MSC.192(79) for radar and MSC.74(69) Annex 3 for AIS.
1059 Corresponding IEC standards are IEC 62388 for radar and IEC 61993-2 for AIS Class A.

1060 The manufacturer's installation manual shall specify that the source for radar information
1061 and/or AIS information for ECDIS shall comply with applicable standards.

1062 (530/A7.4.1) *Transferred radar information may contain a radar image and/or tracked target*
1063 *information.*

1064 (See 8.8.15 g)

1065 (530/A7.3) *ECDIS and added navigational information shall use a common reference system.*
1066 *If this is not the case, a permanent indication shall be provided.*

1067 User or installation manual shall include guidance for implementing a common reference
1068 system (offsets), as applicable.

1069 (See 8.8.16.2)

1070 (530/A7.2) *It shall be possible to remove the radar information, AIS information and other*
1071 *navigational information by a single operator action.*

4.6.2 Radar information**4.6.2.1 Radar image information**

(See 8.8.16.2, 8.8.16.3)

(530/A7.4.2) *If the radar image is added to the ECDIS display, the chart and the radar image shall match in scale, projection and in orientation.*

(530/A7.4.3) *The radar image and the position from the position sensor shall both be adjusted automatically for antenna offset from the conning position (i.e. CCRP).*

The requirements of IEC 62288 for presentation of radar video images shall be met. (See IEC 62288:2021, 5.4.1 and 5.4.2)

4.6.2.2 Tracked radar target information

(See 8.8.16.2, 8.8.16.4)

The requirements of this subclause apply if tracked radar target information is provided.

If tracked radar target information is available it shall be possible to display and provide full presentation functionality for a minimum number of tracked radar target according to Table 1.

Table 1 – Tracked radar target display capacity

Minimum tracked target capacity	40
---------------------------------	----

NOTE 1 Unlike the radar ECDIS does not have multiple categories therefore minimum tracked radar target capacity is equivalent to CAT 1 as defined in IEC 62388.

Where tracked radar target vector information is displayed, it shall be indicated to the operator whether the vectors are relative or true, and if true whether they are sea or ground stabilized.

The system shall process all tracked radar targets reported across the interfaces provided for that purpose. Data sources may report a greater number of tracked radar targets than tracked radar target display capacity provided for ECDIS. To avoid exceeding the tracked radar target display capacity of the ECDIS, means shall be provided to filter tracked radar target data received from external sources for example based on CPA/TCPA, propoximity to or otherwise related to the monitored route. Indications relating to exceeding the capacity for tracked radar targets shall be as specified in IEC 62288.

The system shall present tracked radar targets information in accordance with IEC 62288:2021, 5.5.1 through 5.6.4 and 6.3.3.

The ECDIS shall not track targets, calculate CPA/TCPA values, provide target related alerts or provide target association functionality unless it is fully compliant with relevant sections of IEC 62388. If tracked radar target related alerts are provided, then the alert criteria shall be the same for both AIS and tracked radar targets and it shall be possible to enable or disable both tracked radar target and AIS target related alerts. It shall only be possible to acknowledge target related alerts of Category A when display of target symbols and radar image are both enabled.

The ECDIS may display CPA/TCPA values using information from IEC 61162-1 sentences or IEC 61162-3 PGNs received from an approved radar.

1111 Alert conditions included in the tracked radar target data, e.g. lost target warning and
1112 CPA/TCPA alarm shall not be repeated by ECDIS as an alert but may be graphically indicated
1113 using the appropriate symbols as defined in IEC 62288.

1114 If the interface does not provide all details for CPA/TCPA or if some details are not available
1115 from the interface, then the ECDIS may derive such details from the available details. If
1116 ECDIS derives CPA/TCPA from available values in the interface then the ECDIS shall meet
1117 the CPA/TCPA test requirements of IEC 62388:2013, 11.3.14.7, and shall indicate that the
1118 source of the derived information is ECDIS instead of radar and manufacturer's
1119 documentation shall provide description of the method used to allow review of acceptable
1120 implementation.

1121 NOTE 2 Combination of TTD (protocol version 0), TLB and TTM sentences provides all details including
1122 CPA/TCPA available from radar for tracked targets, but TTM is not a requirement of IEC 62388 and may not be
1123 available from all radars. A combination of TTD (protocol versions 0 and 1) and TLB includes the CPA/TCPA
1124 values. TTD protocol version 1 is described in IEC 61162-1.

1125 Past positions for tracked radar targets may be provided.

1126 The last predicted position of a lost target shall be clearly marked by a lost target symbol on
1127 the display as set forth in IEC 62288:2021, Annex A.

1128 Tracked radar targets shall be removed from the ECDIS 30 seconds after last received
1129 message from the source.

1130 NOTE 3 The radar standard does not specify the target reporting rate. The 30 second timeout is based on an
1131 assumed reporting interval of at least every 10 seconds.

1132 **4.6.2.3 AIS and tracked radar target association**

1133 (See 8.8.16.5)

1134 **4.6.2.3.1 General**

1135 If the ECDIS supports both tracked radar targets and AIS targets, then the ECDIS shall
1136 provide at least one of the target association methods: performed by external source
1137 (4.6.2.3.2) or performed internally (4.6.2.3.3). If both methods are provided, then the selection
1138 of external or internal method shall be by configuration.

1139 Where ECDIS receives AIS targets directly from AIS as well as from an approved radar,
1140 ECDIS shall filter the display of the AIS targets using the MMSI to avoid duplicated targets.

1141 **4.6.2.3.2 Target association – External**

1142 The requirements of this subclause apply if the ECDIS supports external tracked radar targets
1143 and AIS targets. In this case the target association information is provided by an approved
1144 radar using TTD and TLB sentences.

1145 NOTE MMSI number is available in the TLB sentence, see IEC 62388.

1146 AIS and tracked radar target association shall be as specified in IEC 62288:2021, 5.7.1.

1147 **4.6.2.3.3 Target association – Internal**

1148 The requirements of this subclause apply if ECDIS provides an internal solution for target
1149 association.

1150 AIS and tracked radar target association shall be as specified in IEC 62388:2013, 11.8 and in
1151 IEC 62288:2021, 5.7.1.

4.6.3 AIS objects

4.6.3.1 General

(See 8.13.1)

If an interface with AIS is provided, the IEC 62288 requirements for processing, handling and displaying and the related indications apply.

4.6.3.2 AIS functionality and presentation

(See 8.13.2)

ECDIS shall be able to process and display the following VDL messages from AIS:

- a) Messages: 1, 2, 3 and 5 (AIS Target, Class A AIS);
- b) Messages: 18, 19 and 24 (AIS Target, Class B AIS);
- c) Messages 9, 24A and 24B (AIS Aircraft);
- d) Message 21 (AIS AtoN);
- e) Messages 12 and 14 (AIS Safety related messages);
- f) Messages 4 and 24A (AIS Base station);
- g) Messages 1, 14 and 24A (AIS Locating device);
- h) Messages 6, 8, 25 and 26 (AIS Synthetic target);
- i) Messages 5 and 24B (AIS SAR vessel).

ECDIS may be able to process and display AIS ASMs, using the VDL messages 6, 8, 25 and 26, see IEC 62288:2021, 5.15. If provided manufacturer shall specify in user manual which "Display sublayers" of AIS ASM (see IEC 62288:2021, Annex J) are supported.

Processing of AIS objects shall be in accordance with IEC 62288. Additional requirements related to AIS targets are in clause 4.6.3.3.

Where CPA/TCPA information about the AIS targets being presented on the ECDIS is received from the radar interface (using the TTD and TLB sentences defined in IEC 61162-1), this information shall be indicated as not available in the ECDIS 30 seconds after the last sentence received from the radar.

If the radar interface (TTD and TLB sentences defined in IEC 61162-1), is the only source of AIS target information then AIS targets shall be removed from the ECDIS 30 seconds after the last received message from the radar.

NOTE The radar standard may not specify the target reporting rate. The 30 second timeout is based on an assumed reporting interval of at least every 10 seconds.

For the AIS interface, AIS targets shall be removed from the ECDIS within a time-period specified in IEC 62388 for AIS reporting rates, AIS objects not listed in the IEC 62388 shall be removed from the ECDIS as specified in IEC 62288.

4.6.3.3 AIS targets

4.6.3.3.1 General

(See 8.13.3)

AIS targets shall be graphically presented as sleeping or activated targets.

AIS targets that are displayed shall be presented as sleeping targets by default.

1191 The course and speed of an activated AIS target shall be indicated by a predicted motion
1192 vector. The vector time (i.e. length) shall be adjustable.

1193 The ECDIS shall not calculate CPA/TCPA values or provide AIS target related alerts unless it
1194 is fully compliant with relevant sections of IEC 62388. If AIS target related alerts are provided,
1195 then the alert criteria shall be the same for both AIS and tracked radar targets and it shall be
1196 possible to enable or disable both tracked radar target and AIS target related alerts. It shall
1197 only be possible to acknowledge AIS target related alerts of Category A when display of AIS
1198 target symbols, tracked radar target symbols and radar image are enabled.

1199 NOTE IEC 62388 includes specifications for calculation and testing of CPA/TCPA and target related alerts.

1200 The ECDIS may display CPA/TCPA values using information from IEC 61162-1 sentences or
1201 IEC 61162-3 PGNs received from an approved radar.

1202 NOTE Combination of TTD (protocol version 0) and TLB sentences provides all details including CPA/TCPA
1203 available from radar for AIS targets. A combination of TTD (protocol versions 0 and 1) and TLB includes the
1204 CPA/TCPA values.

1205 Alert conditions included in the AIS target data, e.g. lost target warning and CPA/TCPA alarm
1206 shall not be repeated by ECDIS as an alert but may be graphically indicated using the
1207 appropriate symbols as defined in IEC 62288.

1208 If the interface does not provide all details for CPA/TCPA or if some details are not available
1209 from the interface, then the ECDIS may derive such details from the available details. If
1210 ECDIS derives CPA/TCPA from available values in the interface, it shall not use values of
1211 COG and SOG of AIS target available in the interface, and then the ECDIS shall meet the
1212 CPA/TCPA test requirements of IEC 62388:2013, 11.3.14.7, and shall indicate that the source
1213 of the derived information is ECDIS and manufacturer's documentation shall provide
1214 description of the method used to allow review of acceptable implementation.

1215 NOTE Available values of AIS target positions in the interface can be used together with own ship position to
1216 derive relative values used in deriving CPA/TCPA values.

1217 **4.6.3.3.2 Activation and deactivation of AIS targets**

1218 (See t))

1219 A means to activate a sleeping AIS target and to deactivate an activated AIS target shall be
1220 provided.

1221 **4.6.3.3.3 AIS target data**

1222 (See 8.13.3)

1223 It shall be possible to select any AIS target for the alphanumeric display of its data.

1224 For ECDIS the sea stabilization of speed vectors is an option.

1225 Manufacturer's documentation shall include a description of which AIS data if received on the
1226 interface is used and which information and indications presented to the user are derived from
1227 the values available on the interface and the values available for own ship.

1228 Optionally means may be provided for the user to display a list of AIS targets. This list shall
1229 contain, where available:

- 1230 1) vessel name;
- 1231 2) CPA and TCPA;
- 1232 3) range and bearing.

1233 Means shall be available to sort the list.

1234 Means shall be provided to select an AIS target from the list to become a selected target as
1235 defined in IEC 62288. Means shall be provided to centre the displayed area on this AIS target.

1236 **4.6.4 Own ship's AIS information**

1237 (See 8.14)

1238 Requirements for own ship's AIS information apply, if an AIS interface is provided.

1239 Means shall be provided for the user entry of the following data and output of this data via the
1240 interface to AIS. (See Table Q.4, VSD).

1241 a) Cargo category

1242 The user selectable descriptions of ship and cargo shall be textual, which correspond to a
1243 number in the ITU-R M.1371-5 Annex 8, Message 5.

1244 b) Navigation status

1245 The user selectable description of navigation status shall be textual, which corresponds to
1246 a number in the ITU-R M.1371-5 Annex 8, Messages 1, 2, 3.

1247 c) Ship's draft (maximum actual static)

1248 The ship's maximum draft shall be by a number. Refer to ITU-R M.1371-5 Annex 8,
1249 Message 5.

1250 d) Destination

1251 The description of destination shall be a maximum 20-character string. Refer to ITU-R
1252 M.1371-5 Annex 8, Message 5.

1253 e) ETA date and time

1254 Month, day, hours, minutes, universal coordinated universal time (UTC). Refer to ITU-R
1255 M.1371-5 Annex 8, Message 5.

1256 **4.6.5 Anchor watch**

1257 (See 8.15)

1258 NOTE This requirement derives from an IMO formal safety assessment of general cargo ship safety.

1259 Means shall be provided for the operator to specify an anchor location as position offset from
1260 the common reference point to the anchor location on the ship.

1261 Means shall be provided for the operator to specify the radius of the swing circle. When
1262 activated, the anchor watch function shall display the swing circle. The centre of the swing
1263 circle shall be at the position derived from the anchor location and the own ship position at the
1264 time when the operator activated the function, i.e. when the anchor was dropped. An anchor
1265 symbol shall be displayed at the centre of this swing circle.

1266 Optionally means may be provided for the operator to adjust the radius of the swing circle and
1267 the centre point of the swing circle after the function is activated. This adjustment shall
1268 require at least two steps to perform to avoid accidental adjustment.

1269 While the function is activated, the system shall monitor the outline of own ship. If any part of
1270 the outline moves outside the swing circle the system shall raise a warning. If this warning is
1271 not acknowledged within 2 min, and own ship remains outside the swing circle, the alert shall
1272 be escalated to an alarm.

1273 If the anchor watch function is deactivated while this alert is raised, the alert shall be
1274 terminated.

1275 The swing circle and anchor symbol shall be as described in Annex U. The colour shall be red
1276 while any part of the outline of own ship remains outside of the circle.

4.7 Display mode and generation of the neighbouring area

(See 8.8.10)

(530/A8.1) *It shall always be possible to display the system database information in a 'north-up' orientation. Other orientations are permitted. When such orientations are displayed, the orientation shall be altered in steps large enough to avoid unstable display of the chart information.*

NOTE An unstable condition that changes orientation rapidly is distracting and can make text or symbols difficult to read.

(530/A8.2) *ECDIS shall provide for true motion mode. Other modes are permitted.*

(530/A8.3) *When true motion mode is in use, reset and generation of the chart display of the neighbouring area shall take place automatically at own ship's distance from the edge of the display as determined by the mariner.*

(530/A8.4) *It shall be possible to manually change the displayed chart area and the position of own ship relative to the edge of the display.*

(530/A8.5) *If the area covered by the ECDIS display includes waters for which no ENC at a scale appropriate for navigation is available, the areas representing those waters shall carry an indication (see Annex D) to the mariner to refer to the paper chart or to the RCDS mode of operation (see Annex G).*

4.8 Colours and symbols

(See 8.7.1, 8.7.3, 8.8.6)

(530/A9.1) *IHO recommended colours and symbols shall be used to represent system database information (See S-52, Specifications for Chart Content and Display Aspects of ECDIS and S-101, Portrayal Catalogue and S-98, Data Product Interoperability in S-100 Navigation Systems).*

NOTE 1 S-100 based products can provide machine readable portrayal catalogues which contains IHO specified colours and symbols and the testing of the implementation of such products is a part of IHO S-164.

If system database data from a non-IHO source is in use, it may use other colours or symbols than specified by IHO. In this case a permanent indication "unofficial data" shall be provided.

NOTE 2 "unofficial data" indicates that the equipment does not comply with carriage requirement of ECDIS.

If system database data from IHO source is in use and if the representation uses colours or symbols different from those specified by IHO then a permanent indication "unofficial data" shall be provided.

NOTE 3 "unofficial data" indicates that the equipment does not comply with carriage requirement of ECDIS.

(530/A9.2) *The colours and symbols other than those mentioned in 530(106)/A9.1 shall comply with the applicable requirements contained in the IMO standards for navigational symbols (see IEC 62288).*

(530/A9.3) *ECDIS shall allow the mariner to select whether own ship is displayed in true scale or as a symbol.*

4.9 Display requirements

4.9.1 Route planning and monitoring

(530/A10.1) *ECDIS shall be capable of displaying information for:*

1318 1) *route planning and supplementary navigation tasks* (see 4.10.2);

1319 2) *route monitoring* (see 4.10.3).

1320 **4.9.2 Chart presentation size**

1321 (See 8.3.2)

1322 (530/A10.2) *The effective size of the chart presentation for route monitoring shall be at least*
1323 *270 mm by 270 mm.*

1324 **4.9.3 Colour and resolution**

1325 (See 8.7.3, 8.7.4)

1326 (530/A10.3) *The display shall be capable of meeting the colour and resolution*
1327 *recommendations of IHO (See IHO publication S-52 - Specifications for Chart Content and*
1328 *Display Aspects of ECDIS and S-101 – Portrayal Catalogue and S-98).*

1329 **4.9.4 Presentation**

1330 (See 8.7.5)

1331 (530/A10.4) *The method of presentation shall ensure that the displayed information is clearly*
1332 *visible to more than one observer in the conditions of light normally experienced on bridge of*
1333 *the ship by day and by night.*

1334 **4.9.5 Removal of information categories**

1335 (See 8.8.3)

1336 (530/A10.5) *If information categories included in the Standard Display (see Annex A and*
1337 *Annex M) are removed to customize the display, this shall be permanently indicated.*
1338 *Identification of categories which are removed from the Standard Display shall be shown on*
1339 *demand. (See 4.3.3)*

1340 **4.10 Route planning, monitoring, exchange and voyage recording**

1341 **4.10.1 General**

1342 (See 8.9.2, 8.9.4)

1343 (530/A11.1) *It shall be possible to carry out route planning, route monitoring and exchanging*
1344 *of route plans in a simple and reliable manner.*

1345 (530/A11.2) *The largest scale data available in the system database for the area given shall*
1346 *always be used by the ECDIS for all alerts or indications of crossing the ship's safety contour,*
1347 *of being too close to a navigational hazard including point object, such as a fixed or floating*
1348 *aid to navigation or isolated danger and of entering a prohibited area, and for alerts and*
1349 *indications according to Annex D.*

1350 NOTE IHO standards specify hydrographic objects that are navigational hazards.

1351 **4.10.2 Route planning and exchange**

1352 **4.10.2.1 Route plan**

1353 (See 8.9.2)

1354 (530/A11.3.1) *It shall be possible to carry out route planning including both straight, curved*
1355 *segments and schedule.*

1356 (530/A11.3.2) *It shall be possible to adjust a planned route alphanumerically and graphically*
1357 *including:*

- 1358 1) *adding waypoints to a route;*
1359 2) *deleting waypoints from a route;*
1360 3) *changing the position of a waypoint.*

1361 (530/A11.3.3) *It shall be possible to plan one or more alternative routes in addition to the*
1362 *selected route for monitoring. The selected route for monitoring shall be clearly*
1363 *distinguishable from the other routes.*

1364 (530/A11.3.6) *A graphical indication is required if the mariner plans a route closer than a user*
1365 *specified distance from own ship's safety contour.*

1366 The graphical indication shall be provided automatically using IEC 62288:2021, Table A.3,
1367 graphical symbol 3.5 b. Textual information related to the reason for the graphical indication
1368 shall be available at least on demand.

1369 The graphical highlight shall be the intersection between the user specified distance from the
1370 planned route and the charted feature/object.

1371 The charted feature/object which is the origin of the indication shall be displayed on demand
1372 together with the IEC 62288:2021, Table A.3, graphical symbol 3.5 b. This may require
1373 temporary override of the user selected viewing group layers (see Annex M) or temporary
1374 display of a charted feature/object from the largest scale available.

1375 (530/A11.3.7) *A graphical indication shall be given if the mariner plans a route closer than a*
1376 *user-specified distance from the boundary of a user-selectable category of a prohibited area*
1377 *or geographic area for which special conditions exist (see Annex C). A graphical indication*
1378 *shall also be given if the mariner plans a route closer than a user-specified distance from a*
1379 *user-selectable category of navigational hazards as based on IHO standards including point*
1380 *objects, such as a fixed or floating aid to navigation or isolated danger. The user-selectable*
1381 *categories shall be the same as the user selections for the display of objects and be based on*
1382 *IHO standards. There shall be a permanent indication when any user-selectable categories*
1383 *are deselected. Details of the deselection shall be available on demand.*

1384 The graphical indication shall be provided automatically using IEC 62288:2021, Table A.3,
1385 graphical symbol 3.5 c. Textual information related to the reason for the graphical indication
1386 shall be available at least on demand.

1387 The graphical highlight shall be the intersection between the user specified distance from the
1388 planned route and the charted feature/object.

1389 The charted feature/object which is the origin of the indication shall be displayed on demand
1390 together with the IEC 62288:2021, Table A.3, graphical symbol 3.5 c. This may require
1391 temporary override of the user selected viewing group layers (see Annex M) or temporary
1392 display of a charted feature/object from the largest scale available.

1393 Graphical indication in the chart area shall be selectable between on and off states separately
1394 for navigational hazards and for each type of prohibited area or each type of area with special
1395 conditions (see Annex C). If any of the selectable indications is in the off state, there shall be
1396 a relevant permanent indication: "Indication of navigational hazards is Off" or "Indication of
1397 some prohibited areas or areas with special conditions is Off". The full list of prohibited areas
1398 or areas with special conditions in the off state shall be available on demand.

1399 (530/A.11.3.8) *It shall be possible for the mariner to select that the indications related to the*
1400 *safety contour, prohibited areas, geographic areas for which special conditions exist and*
1401 *navigational hazards take into account accuracy information of relevant hydrographic*
1402 *information, as defined by IHO standards (IHO S-52, S-98).*

1403 The same user-specified distance shall be used for the check of safety contour, prohibited
1404 areas, geographic areas for which special conditions exist and navigational hazards and
1405 means shall be provided to set these distances separately for each leg and each side of the
1406 leg of a route plan.

1407 (530/A11.3.9) *It shall also be possible to perform a complete route check to support the*
1408 *appraisal and planning process according to the applicable parts of resolution A.893(21).*
1409 *Detected objects shall be available for review in graphical form and, on demand, in textual*
1410 *form.*

1411 NOTE 1 Complete route check consist of human inspection of the content of the ENDS related to the route plan
1412 and ECDIS assisted checks based on the content of the ENDS. Detailed IHO specifications of how the electronic
1413 nautical publications are used for ECDIS assisted checks of route were not available at the time of the publishing
1414 of this document. Detailed specifications of how the ENC charts (either S-57 or S-101) and user selected safety
1415 contour based on water level adjusting (S-102 together S-104) are used for ECDIS assisted check were available
1416 at the time of the publishing of this document.

1417 In support of the appraisal and planning process the following rules apply:

1418 1) it shall be possible to plan action points along the route as defined in IEC 63173-1. Each
1419 action point shall include the time or distance at which an action will be given during route
1420 monitoring.

1421 Critical points shall be implemented using the RouteActionPoint object as defined in IEC
1422 63173-1. For a critical point value 5 shall be used to indicate a warning as the action in
1423 the RouteActionPointRequiredAction attribute;

1424 2) it shall be possible to link action points to S-100 based ENDS data within the system
1425 database;

1426 NOTE 2 IHO S-100 includes the concept of an "interoperabilityIdentifier" attribute expressed as a Maritime
1427 Resource Name (MRN). A link to ENDS data within the system database can be established by storing the
1428 value of the MRN for the related object in the "routeActionPointExternalReference" of the action point.

1429 3) additional mariner's information (see 4.10.4) can support the appraisal and planning
1430 process according to the applicable parts of resolution A.893(21). Additional mariner's
1431 information may be organized in similar way to route plans, which means separately
1432 named entities such as files or databases. It shall be possible to link a route plan to such
1433 separately named entities of additional mariner's information;

1434 4) it shall be possible to list waypoints and action points from route plan in the same
1435 sequence as they will appear when the ship sails the planned route. The listed sequence
1436 may also include additional mariner's information along the route.

1437 EXAMPLE The sequence can be: waypoint 1 with ETD, caution (dangerous area), waypoint 2 with ETA,
1438 caution (danger), information (leave pilot), waypoint 3 with ETA, information (speed limit), etc.

1439 (530/A11.3.10) *It shall be possible for the mariner to specify for each leg a cross track limit of*
1440 *deviation from the planned route at which an automatic off-track alarm shall be activated.*

1441 This cross track limit shall be equal or less than the user-specified distance from the route
1442 used for the check of safety contour, prohibited areas, geographic areas for which special
1443 conditions exist and navigational hazards.

1444 **4.10.2.2 Route plan exchange with other equipment**

1445 (See 8.9.3)

1446 NOTE This subclause does not address facilities required for mandatory back-up arrangements, see 4.14.

1447 Means shall be provided to export and import route plans with other equipment. The media
1448 used may be a removable memory device (for example USB memory stick, SD card, etc.) or a
1449 fixed wired interface (for example IEC 61162-450, see 4.12.7 and Annex T). The format as
1450 described in IEC 63173-1 shall be supported and the format as described in Annex S may be
1451 supported.

1452 The ECDIS shall be able to handle at least 1000 waypoints and 1000 action points in a single
1453 route plan.

1454 The ECDIS shall refuse to accept a route plan which contains more waypoints or action points
1455 than the ECDIS can handle. The manufacturer shall specify the maximum number of
1456 waypoints and action points within a single route plan accepted by the ECDIS in user manual.

1457 The ECDIS shall inform the user when a route is rejected and shall indicate the reason why.

1458 **4.10.2.3 Route plan exchange with shore-based maritime service providers**

1459 (See 8.9.4)

1460 *(530/A11.3.4) It shall be possible to exchange, send and receive, both selected and*
1461 *alternative route plans with shore-based maritime service providers. The exchange shall be in*
1462 *accordance with standard formats for route plan exchange (IEC 63173-1, S-421) and shall*
1463 *use standard service interfaces including information security protection to allow for secure*
1464 *machine-machine communication (IEC 63173-2, SECOM). Received route plans shall be*
1465 *considered as a basic indication of preferred intention and shall be indicated by ECDIS as "for*
1466 *voyage planning purposes only". The use of the received route plans shall be controlled by*
1467 *the master, in accordance with SOLAS regulations V/34 and V/34-1, respecting the master's*
1468 *professional judgement and discretion.*

1469 The implementation of SECOM compliance may be sub-divided into multiple physical or
1470 logical devices inside and outside of the ECDIS. Result shall be so that it is possible to
1471 exchange, send and receive, both selected and alternative route plans with shore-based
1472 maritime service providers. The manufacturer shall describe how the conformity with IEC
1473 63173-2 has been implemented. The conformity with IEC 63173-2 may be implemented within
1474 the 460-Gateway (see IEC 61162-460).

1475 The ECDIS shall inform the mariner about a newly received route plan. The user manual shall
1476 describe how the mariner is informed.

1477 The received route shall have status "for voyage planning purposes only". The status "for
1478 voyage planning purposes only" of received route plan shall be maintained until the route is
1479 selected for route planning.

1480 There shall be an indication when a route plan with status "for voyage planning purposes
1481 only" is displayed graphically or as text or as a name of route.

1482 Graphical display of a route plan with this status shall use the symbology of IEC 62288:2021,
1483 Table A.3, graphical symbol 3.1.b specified for alternate or planned route.

1484 *(530/A11.3.5) The exchanged route plan shall include a route schedule including estimated*
1485 *time of departure and estimated time of arrival as soon as they can be determined with*
1486 *reasonable accuracy.*

1487 If either estimated time of departure or estimated time of arrival is unavailable, an operator
1488 action to confirm the mariner's intention to send a route without a schedule shall be required
1489 before the route is sent to a shore-based maritime service provider.

1490 The ECDIS shall be able to handle at least 1000 waypoints and 1000 action points in a single
1491 route plan.

1492 The ECDIS shall refuse to accept a route plan which contains more waypoints or action points
1493 than the ECDIS can handle. The manufacturer shall specify the maximum number of
1494 waypoints and action points within a single route plan accepted by the ECDIS in user manual.

1495 The ECDIS shall inform the user when a route is rejected and shall indicate the reason why.

1496 **4.10.3 Route monitoring**

1497 (See 8.8.14, 8.9.5)

1498 (530/A11.4.1) *For route monitoring the selected route and own ship's position shall appear*
1499 *whenever the display covers that area.*

1500 (530/A11.4.2) *It shall be possible to display a sea area that does not have the ship on the*
1501 *display (e.g., for look ahead, route planning), while route monitoring. If this is done on the*
1502 *display used for route monitoring, the automatic route monitoring functions (e.g., updating*
1503 *ship's position, and providing alerts and indications) shall be continuous. It shall be possible*
1504 *to return to the route monitoring display covering own ship's position immediately by single*
1505 *operator action.*

1506 The ECDIS shall allow the user to select a route for monitoring only if the status "for voyage
1507 planning purposes only" is not set.

1508 The ECDIS shall allow the user to select a route for monitoring only if the route has been
1509 checked that the radius of planned turns allows each turn to complete before the next turn.

1510 The ECDIS shall either:

1511 a) allow the user to select a route for monitoring only if the route has been checked for
1512 safety contour, prohibited areas, geographic areas for which special conditions exist and
1513 navigational hazards as specified in 4.10.2.1. or;

1514 NOTE 1 The requirement is that the check has been performed, but there are no requirements related to the
1515 results from this check that prevent use of the route for monitoring.

1516 b) have a permanent indication that the monitored route has not been checked for safety
1517 contour, prohibited areas, geographic areas for which special conditions exist and
1518 navigational hazards as specified in 4.10.2.1.

1519 NOTE 2 A route originating from an ECDIS or from an ECDIS backup arrangement from the same manufacturer
1520 can have facilities to inform if these checks are already done.

1521 (530/A11.4.3) *ECDIS shall give an alarm and related graphical indication if, within a specified*
1522 *look-ahead time or distance set by the mariner, own ship will pass closer than user-selected*
1523 *distance from the safety contour. There shall be a permanent indication when the safety*
1524 *contour alarm is deselected (i.e. switched off by the mariner).*

1525 The intersection between the own ship look-ahead and the charted feature/object for which
1526 the alarm is raised shall be graphically highlighted using IEC 62288:2021, Table A.3,
1527 graphical symbol 3.5 b.

1528 The charted feature/object which is the origin of the alarm shall be displayed on demand
1529 together with the IEC 62288:2021, Table A.3, graphical symbol 3.5 b. This may require
1530 temporary override of the user selected viewing group layers (see Annex M) or temporary
1531 display of a charted feature/object from the largest scale available.

1532 Optionally, the graphical indication in the chart area may be selectable between on and off
1533 state. When selected for off state, a permanent indication shall be provided that the "Safety
1534 contour highlight is Off".

1535 (530/A11.4.4) *ECDIS shall give a warning or caution, or indication, as selected by the*
1536 *mariner, and related graphical indication if, within a specified look-ahead time or distance set*
1537 *by the mariner, own ship will pass closer than a user-selected distance from the boundary of a*
1538 *user-selectable category of prohibited area or of a geographic area for which special*
1539 *conditions exist. (See Annex C). The user-selectable categories shall be the same as in*

1540 *selections for the display of objects and be based on IHO standards. There shall be a*
1541 *permanent indication when any user-selectable categories are deselected. Details of the*
1542 *deselection shall be available on demand.*

1543 The intersection between the own ship look-ahead and the charted feature/object for which
1544 the warning, caution or indication is raised shall be graphically highlighted using
1545 IEC 62288:2021, Table A.3, graphical symbol 3.5 c.

1546 The charted feature/object which is the origin of the warning or caution shall be displayed on
1547 demand together with the IEC 62288:2021, Table A.3, graphical symbol 3.5 c. This may
1548 require temporary override of the user selected viewing group layers (see Annex M) or
1549 temporary display of a charted feature/object from the largest scale available.

1550 Graphical indication in the chart area shall be selectable between on and off states separately
1551 for each prohibited area or area with special condition (see Annex C). If any indication is in
1552 the off state, a permanent indication: "PRBAREA highlight is off" shall be provided. The full
1553 list of prohibited areas or areas with special conditions in the off state shall be available on
1554 demand.

1555 (530/A11.4.5) *An alarm shall be given when the specified cross track limit for deviation from*
1556 *the selected route, if defined by the mariner when route planning, is exceeded.*

1557 NOTE 3 Route monitoring will only provide an automatic alarm if the mariner has entered the appropriate data in
1558 4.10.2.

1559 (530/A11.4.6) *ECDIS shall give a warning or caution or indication as selected by the mariner*
1560 *and related graphical indication if, continuing on its present course and speed, over a*
1561 *specified look-ahead time or distance set by the mariner, own ship will pass closer than a*
1562 *user-specified distance from a user-selectable category of navigational hazard as based on*
1563 *IHO standards including danger (e.g. obstruction, wreck, rock) that is shallower than the*
1564 *mariner's safety contour or a user-selectable category of aid to navigation. The user-*
1565 *selectable categories shall be the same as user selections for the display of objects and be*
1566 *based on IHO standards. There shall be a permanent indication when any of the user-*
1567 *selectable categories are deselected. Details of the deselection shall be available on demand.*

1568 The intersection between the own ship look-ahead and the charted feature/object for which
1569 the warning, caution or indication is raised shall be graphically highlighted in the chart area
1570 using IEC 62288:2021, Table A.3, graphical symbol 3.5 c.

1571 The charted feature/object which is the origin of the caution shall be displayed on demand
1572 together with the IEC 62288:2021, Table A.3, graphical symbol 3.5 c. This may require
1573 temporary override of the user selected viewing group layers (see Annex M) or temporary
1574 display of a charted feature/object from the largest scale available.

1575 Optionally, the graphical indication in the chart area may be selectable between on and off
1576 states. When selected for off state, a permanent indication shall be provided that the
1577 "Indication of navigational hazards is Off".

1578 The look-ahead area, expressed as time or distance and as a perpendicular distance, is set
1579 by the mariner to control how far in advance an alert will be given. The same look-ahead area
1580 shall be applied for approaching the boundary of a prohibited area, area with special
1581 conditions, safety contour or proximity to a navigational hazard. The same look-ahead area
1582 shall be applied to the additional mariner's information, see 4.10.4, when marked as a danger.

1583 (530/11.4.7) *A graphical indication shall be given if the current or the next leg of the selected*
1584 *route passes closer than a user-specified distance from the safety contour.*

1585 [Optionally, the graphical highlight in the chart area may be selectable between on and off
1586 states. When selected for off state, a permanent indication shall be provided that the
1587 “[Highlight of Safety contour for current and next leg are Off][TBD]”.]

1588 (530/11.4.8) *A graphical indication shall be given if the current or the next leg of the selected*
1589 *route goes closer than a user-specified distance from the boundary of a user-selectable*
1590 *category of prohibited area or a geographic area for which special conditions exist (See*
1591 *Annex C). A graphical indication shall also be given if the current or the next leg of the*
1592 *selected route goes closer than a user-specified distance from a user-selectable category of*
1593 *navigation hazard as based on IHO standards including point objects, such as a fixed or*
1594 *floating aid to navigation or isolated danger (e.g. obstruction, wreck, rock that is shallower*
1595 *than the mariner's safety contour). The user-selectable categories shall be the same as user*
1596 *selections for the display of objects and be based on IHO standards.*

1597 The intersection between the current or the next leg of the selected route and the charted
1598 feature/object for which the indication is raised shall be graphically highlighted in the chart
1599 area using IEC 62288:2021, Table A.3, graphical symbol 3.5 c.

1600 The check of the current or the next leg of the selected route shall use the same user-
1601 specified distance for the safety contour, prohibited areas, geographic areas for which special
1602 conditions exist and navigational hazards. The user-specified distance may be different for
1603 each leg and each side of the leg.

1604 [Optionally, the graphical highlight in the chart area may be selectable between on and off
1605 states. When selected for off state, a permanent indication shall be provided that the
1606 “[Indication current and next leg are Off][TBD]”.]

1607 (530/11.4.9) *It shall be possible for the mariner to select that the indications of 530/11.4.3,*
1608 *530/11.4.4, 530/11.4.6, 530/11.4.7 and 530/11.4.8 take into account accuracy information of*
1609 *relevant hydrographic information, as defined by IHO standards.*

1610 (530/A11.4.12) *A warning shall be given by ECDIS when the ship reaches a specified time or*
1611 *distance, set by the mariner, in advance of a critical point on the planned route.*

1612 Action points with RouteActionPointRequiredAction values other than 5 (warning) shall
1613 indicate the required action when the ship meets the distance or time setting.

1614 (530/A11.4.14) *It shall be possible to display alternative routes in addition to the selected*
1615 *route, where any have been planned. The selected route shall be clearly distinguishable from*
1616 *the other routes. During the voyage, it shall be possible for the mariner to modify the selected*
1617 *sailing route or to change to an alternative route.*

1618 (530/A11.4.15) *If the selected route is changed during the voyage, it shall be possible to send*
1619 *the updated route plan to shore-based maritime service providers.*

1620 “Changed during the voyage” means any change to the monitored route.

1621 (530/A11.4.15) *A route plan received from shore-based maritime service providers shall only*
1622 *be selected for monitoring after confirmation by the master, see details in 4.10.2.3 for*
1623 *handling of this case,*

1624 NOTE 4 Confirmation by the master is not an equipment feature, but an onboard procedure for the members of the
1625 crew.

1626 (530/A11.4.16) *It shall be possible to display:*

1627 a) *time-labels along a ship's track manually on demand and automatically at intervals*
1628 *selected between 1 min and 120 min; and*

1629 *b) an adequate number of points, free movable electronic bearing lines (EBL), variable*
1630 *and fixed range markers (VRM), and other symbols required for navigation purposes and*
1631 *as specified in Annex B.*

1632 Measurements from own ship (for example, range rings, range and bearing, cursor, tracking
1633 data) shall be made with respect to the CCRP.

1634 There shall be at least two EBLs and two VRMs.

1635 **4.10.4 Additional mariner's information**

1636 (See **TBD**)

1637 The mariner shall be provided with the capability of adding at least the following symbols,
1638 lines and areas to the system database, and shall be able to revise or delete them:

- 1639 1) simple point objects including the mariner's caution note (!) or mariner's information note[i]
1640 symbol (see Annex U) used to call up a note on the text display by cursor picking;
- 1641 2) simple lines and areas with or without colour fill, set up for cursor picking to give
1642 explanatory notes in the text display;
- 1643 3) text notes.

1644 NOTE 1 The above core version of additional mariner's information is also available in IHO S-52/2.3.1(b) and in
1645 IHO S-98/C-9.1.2.

1646 Optionally, any of the above may be marked as danger to activate alerts or indications, see
1647 4.10.2.1 and 4.10.3.

1648 Additional mariner's information may be linked to S-100 based ENDS data within the system
1649 database.

1650 NOTE 2 IHO S-100 includes the concept of an "interoperabilityIdentifier" attribute expressed as a Maritime
1651 Resource Name (MRN).

1652 **4.10.5 Position integration**

1653 (See 8.8.15, 0)

1654 (530/A11.4.10) *The ship's position shall be derived from a continuous positioning system of*
1655 *an accuracy consistent with the requirements of safe navigation. Whenever possible, a*
1656 *second independent positioning source, preferably of a different type shall be provided. In*
1657 *such cases ECDIS shall be capable of identifying discrepancies between the two sources.*

1658 The ECDIS shall have means to display the position from at least two positioning methods, to
1659 identify to the operator which method is being used, and provide a means for the operator to
1660 select the method to use. Manually obtained position fix and dead reckoning functions are
1661 required as one secondary independent positioning source, but these are not considered to
1662 be continuous even if it is based on continuous heading and speed sources. Refer to 4.10.7.

1663 ECDIS shall permanently indicate using a yellow colour the source of the position whenever
1664 the source is from non continuous position system or method.

1665 NOTE 1 Yellow indicates here information with doubtful integrity in accordance with IEC 62288:2021, 4.8.2.1.

1666 (530/A11.4.11) *ECDIS shall provide a warning when the input from the continuous position,*
1667 *heading or speed sources is lost (i.e. no valid position, heading or speed source remains in*
1668 *use). ECDIS shall also repeat, but only as an indication, any alert or indication passed to it*
1669 *from position, heading or speed sources.*

1670 NOTE 2 An indication can be provided on the loss of a sensor. Where no other alert is provided for the situation,
1671 e.g. the 'doubtful position/heading/speed' alert, a caution for the loss of a sensor can be provided

1672 (530/A11.4.13) *The positioning system and the system database shall be on the same*
1673 *geodetic datum. ECDIS shall give a warning if this is not the case.*

1674 (530/A11.4.20.2) *ECDIS shall indicate discrepancies between the positions obtained by*
1675 *continuous positioning systems and positions obtained by manual observations.*

1676 (530/A11.4.18) *It shall be possible to adjust the displayed geographic position of the ship*
1677 *manually. This manual adjustment shall be noted alpha-numerically on the screen (i.e.*
1678 *permanently indicated), maintained until altered by the mariner, and automatically recorded.*

1679 **4.10.6 Object information**

1680 (See 8.8.13)

1681 (530/A11.4.17) *It shall be possible to enter the geographic coordinates of any position and*
1682 *then display that position on demand. It shall also be possible to select any point (features,*
1683 *symbol or position) on the display and read its geographical co-ordinates on demand.*

1684 **4.10.7 LOP position fix**

1685 (See 8.9.9)

1686 (530/A11.4.19.1) *ECDIS shall provide the capability to enter and plot manually obtained*
1687 *bearing and distance lines of position (LOP) including the time of observation, and calculate*
1688 *the resulting position of own ship. It shall be possible to use the resulting position as an origin*
1689 *for dead-reckoning.*

1690 It shall be possible for mariner to adjust the time of the observation of the LOP. It shall be
1691 possible to transfer LOPs to the time of the last observation.

1692 Position plots shall indicate the time the plot was accepted and, in the case of estimated
1693 position, fix or dead-reckoned position plot (EP, fix or DR), the type of plot. Indication of the
1694 source of data used for the position may be selectable, on or off, by the operator.

1695 Data for accepted position plots and the associated LOPs shall be recorded in the voyage
1696 recording (see 4.10.8).

1697 **4.10.8 Voyage recording**

1698 (See 8.9.7)

1699 (530/A11.5.1) *ECDIS shall store and be able to reproduce certain minimum elements required*
1700 *to reconstruct the navigation and verify the official database used during the previous*
1701 *12 hours. The following data shall be recorded at one minute intervals:*

1702 1) *to ensure a record of own ship's past track: time, position (from the position source in*
1703 *use), heading and speed; and*

1704 2) *to ensure a record of official data used: ENC (S-57 or S-101), S-102 and S-104 source,*
1705 *edition, date, cell and update history.*

1706 3) *any changes in safety contour, look ahead and route monitoring alert settings.*

1707 The same data recording requirements apply to the use of any RNC or unofficial chart
1708 database.

1709 (530/11.5.2) *ECDIS shall output the information listed in 530/11.5.1.2 as amended by this*
1710 *document and 530/11.5.1.3 to a voyage data recorder (see 4.12.3.3 and Q.2).*

1711 (530/A11.5.3) *In addition, ECDIS shall record the complete track for the entire voyage, with*
1712 *time marks at intervals not exceeding 4 hours.*

1713 For the purposes of logging, the entire voyage is defined as a maximum period of three
1714 months.

1715 (530/A11.5.4) *It shall not be possible to manipulate or change the recorded information.*

1716 (530/A11.5.5) *ECDIS shall have a capability to preserve the record of the previous 12 hours*
1717 *and of the voyage track.*

1718 **4.11 Calculations and accuracy**

1719 (See 8.6, 8.8.22 f))

1720 (530/A12.1) *The accuracy of all calculations performed by ECDIS shall be independent of*
1721 *the characteristics of the output device and shall be consistent with the system database*
1722 *accuracy.*

1723 The output device includes the ECDIS display, stored memory, and/or printout.

1724 (530/A12.2) *Bearings and distances drawn on the display, or those measured between*
1725 *features already drawn on the display, shall have accuracy no less than that afforded by the*
1726 *resolution of the display.*

1727 (530/A12.3) *The system shall be capable of performing and presenting the results of at least*
1728 *the following calculations:*

- 1729 1) *true distance and azimuth (i.e. bearing) between two geographical positions;*
1730 2) *geographic position from known position and distance/azimuth (i.e. bearing); and*
1731 3) *geodetic calculations such as spheroidal distance, rhumb line, and great circle.*

1732 Accuracy of geodetic calculations shall be for distance within 1 % or 30 m, whichever is the
1733 greater distance and shall be for bearings within 1° (see Annex J).

1734 **4.12 Connections with other equipment (interfaces)**

1735 **4.12.1 Connection with navigation and radio equipment**

1736 (See 8.2.1, 8.6)

1737 (530/A15.1) *ECDIS shall not degrade the performance of any equipment providing sensor*
1738 *inputs. Nor shall the connection of optional equipment degrade the performance of ECDIS*
1739 *below this standard.*

1740 (530/A15.2) *ECDIS shall be connected to the ship's position fixing system, to the gyro*
1741 *compass and to the speed and distance measuring device. For ships not fitted with a gyro*
1742 *compass, ECDIS shall be connected to a marine transmitting heading device.*

1743 ECDIS shall also be capable to be connected to CAM-system, BNWAS, ECDIS back-up
1744 system and VDR. Optionally ECDIS may be connected to other navigational and
1745 communication equipment, for example Radar, INS, AIS, Autopilot, Track Control, Echo
1746 sounder, EGC, NAVTEX and GMDSS radio communication equipment.

1747 As a minimum, the ECDIS shall support the interfaces as given in Annex Q. The manufacturer
1748 shall specify which physical interfaces are supported. In addition, suitable alternative input or
1749 output interfaces may be used.

1750 **4.12.2 Connection with CAM system**

1751 (See 8.2.2)

1752 ECDIS shall provide an alert management interface as specified in Annex Q.

1753 **4.12.3 Connection with VDR**

1754 (See 8.2.3)

1755 **4.12.3.1 VDR interface**

1756 An interface with VDR shall be provided based on IEC 61162-450 and IEC 61996-1:2021,
1757 Annex E and Annex G.

1758 **4.12.3.2 Transfer of screen image**

1759 A subjectively lossless graphic algorithm shall be used as defined in IEC 61996-1:2021, 5.8
1760 (VDR).

1761 Means shall be provided to configure at installation the header data for the following
1762 information in the "Status and information text field" as described in IEC 61996-1:2021,
1763 Annex E:

1764 a) identity of the class of image including source type together with identifier, for example
1765 "Source:ECDIS.2";

1766 b) identity of the display location.

1767 The Ethernet interface shall provide digital file transfers of one screen capture each 15 s.
1768 Means may be provided to configure the use of higher update rates.

1769 Means shall be provided to change the synchronization of the image message transfer to the
1770 local clock within the 15 s update period. The default synchronization shall be ECDIS.1 local
1771 clock +8 i.e. send at:08,:23,:38,:53, ECDIS.2 local clock +12 i.e. send at:12,:27,:42,:57.

1772 **4.12.3.3 Transfer of ECDIS display source information**

1773 ECDIS display source information shall be transferred to VDR as defined in
1774 IEC 61996-1:2021, Annex G, Table G.1. Items defined in IEC 61996-1:2021, Annex G,
1775 Table G.2 may be included. The transfer shall happen at least every 10 min if the reported
1776 information is unchanged from previous transfer. The transfer shall happen within 2 s when
1777 any of the reported information has been changed.

1778 The content of ECDIS display source information shall include charts used for display
1779 purposes, charts used for alert purposes (i.e. largest scales available) and any changes in
1780 safety contour, look ahead and route monitoring alert settings.

1781 **4.12.4 Connection with BNWAS**

1782 (See 8.2.4)

1783 To provide user activity information to BNWAS, an EVE sentence as specified in IEC 61162-1
1784 shall be output in response to user-interaction with the ECDIS under conditions described in
1785 the user manual.

1786 It is a requirement of BNWAS that it shall not be possible to initiate the reset function or
1787 cancel any audible alarm from any device, equipment or system not physically located in
1788 areas of the bridge providing proper look out. The ECDIS installation manual shall contain
1789 instructions about installation locations and/or configuration of the possibility of resetting the
1790 BNWAS timer from the ECDIS when the BNWAS interface can be connected or configured to
1791 reset the dormant period of the BNWAS.

4.12.5 Connection for system database information

(530/A15.3) *ECDIS may provide a means to supply system database information to external equipment.*

NOTE Test of this interface, if provided, is not required. The format of system database data is by definition a manufacturer's internal ECDIS format and the data interface between an ECDIS and the external equipment for system database data transfer is not defined in IEC 61162-1.

4.12.6 Connection with NAVTEX or EGC for MSI

(See 8.16)

If provided, an interface with either NAVTEX (IEC 61097-6) or EGC (for example IEC 61097-4 and IEC 61097-16) shall comply with the following requirements for processing and presentation of MSI messages received via NAVTEX or EGC.

- a) Provide an indication when a new MSI message is received until it has been displayed or 24 h have passed.
- b) This indication may be suppressed if the MSI message does not meet criteria set by the mariner.
- c) Means shall be provided for the operator to enter criteria for suppression of indication of new MSI messages based on time and distance from own ship, monitored route or planned route. Default setting is no suppression.

NOTE The criteria set for ECDIS indication of new MSI messages are independent of such settings on the MSI receiver which may optionally be controllable by NRM sentence for NAVTEX.

- d) Details of the coverage areas and message categories which have been excluded by the operator from reception and/or display should be readily available.
- e) For NAVTEX ECDIS shall provide means to view the receiver INS mask set inside the NAVTEX (see IEC 61097-6). Optionally ECDIS may provide means to set the NAVTEX receiver mask(s). The elements of the INS mask are: Frequency, transmitter coverage area and message type (see NRM sentence). The elements of the INS mask shall be provided for display as characters 'A', 'B', etc.. ECDIS shall send a query sentence requesting an NRM sentence prior to display of the INS mask.
- f) Capability for data storage of MSI messages for at least 255 most recent messages per each source of MSI shall be provided.
- g) The user shall be able to tag individual messages for permanent retention. These messages may occupy up to 25 % of the available memory and shall not be overwritten by new messages. When no longer required, the user shall be able to remove these messages.
- h) Means shall be provided to view the most recent message, past messages, and to view messages associated with selection of MSI symbols in the graphical display area.
- i) Means for viewing MSI messages shall provide at least 16 lines of message text at a time with a minimum of 40 characters/line.

4.12.7 Connection for transfer of route information

(See 8.17)

This subclause applies for IEC 61162-450 based interfaces to send and to receive information on a monitored route and alternate routes with other navigation equipment; for example, backup ECDIS, planning workstation, radar, etc. (see Annex T). See 4.10.2.2 for route formats to be used in this interface.

Means shall include:

- a) bidirectional transfer of route(s) for editing purposes. The reported type of transferred route is A in the RRT sentence;

- 1839 b) transfer of route for monitoring purpose. The reported type of transferred route is M in the
1840 RRT sentence;
- 1841 c) sending of RRT sentences using IEC 61162-450 to inform another party (i.e. including a
1842 destination TAG block for a specified recipient) about the transfer of a route, and
1843 reception of RRT sentences using IEC 61162-450 for file transfer status and intended
1844 application status (see Annex T);
- 1845 d) for sending:
- 1846 • a method to initiate transfer of a route;
 - 1847 • indication of the status of the IEC 61162-450 file transfer and the status of the
1848 intended application based on the received RRT sentence;
 - 1849 • indication of no response if the RRT sentence is not received within the
1850 manufacturer's specified timeout;
- 1851 e) for receiving:
- 1852 • a method to accept or reject a received route at application;
 - 1853 • reporting to the sender the status of the IEC 61162-450 file transfer and the status of
1854 the intended application based on the received RRT sentence. This reporting can be
1855 either by one or two RRT sentences. In a one sentence report a single RRT sentence
1856 reports both file transfer status and application level status. In a two sentence report
1857 the first RRT sentence reports only the file transfer status and the second RRT
1858 sentence reports the application level status;
 - 1859 • if the receiver is an ECDIS, a method to perform a safety check of the received route
1860 against chart database and a method to perform a geometry check at application level;
 - 1861 • a method to request a route from another ECDIS after power on (See Annex T,
1862 Q=Query for transmitting any monitored route or alternative route for editing);
- 1863 f) a log of these interactions.

1864 4.12.8 Connection with INS

1865 (See 8.18)

1866 An interface to the INS shall be provided as specified in Annex Q. When the interface is
1867 configured, the ECDIS shall indicate the received integrity and plausibility of the basic CCRS
1868 values using the information in the NSR sentence. Colour coding of the values as specified in
1869 IEC 62288 shall be used.

1870 4.12.9 Connection with GMDSS radio communication equipment for received distress 1871 alert

1872 (See 8.19)

1873 If an interface for receipt of a GMDSS distress alert is provided the following shall apply.

- 1874 a) The processing and display capacity of GMDSS distress alert objects shall be at least 20.
- 1875 b) Any received GMDSS distress message related to the MMSI of the own ship shall be
1876 ignored.
- 1877 c) If the MMSI of a GMDSS distress message does not correspond to an MMSI of an existing
1878 GMDSS distress alert object, a new GMDSS distress alert object shall be created,
- 1879 d) If the MMSI of a GMDSS distress message corresponds to an MMSI of an existing
1880 GMDSS distress alert object, the related graphical display and values shall be updated.
- 1881 e) If the MMSI of the transmission source of the GMDSS distress message is same as the
1882 MMSI of the reported vessel in distress in the received message, then this is a self-
1883 cancellation and the ECDIS shall automatically remove the related GMDSS distress alert
1884 object.

1885 NOTE 1 If a search and rescue organization acknowledges the distress, the MMSI of the transmission source
1886 of the GMDSS distress message is different than the MMSI of the reported vessel in distress.

f) If the MMSI of the GMDSS distress alert does not correspond to an MMSI of an AIS target, the Target in Distress symbol **TBD** shall be presented, see Annex U.

g) If the MMSI of the GMDSS distress alert corresponds to the MMSI of an AIS target, both the AIS target and the GMDSS distress alert object shall be combined, and the position reported for AIS target shall update the position reported for the GMDSS distress alert object. A single symbol **TBD** shall be presented for such a combination, see Annex U.

NOTE 2 AIS target and GMDSS distress alert objects are two separate entities. If the AIS target is removed for any reason the GMDSS distress alert object continues to exist.

h) The following information shall be available for presentation in alphanumeric form when a GMDSS distress alert object is selected

- MMSI of vessel in distress
- Position
- Time of position
- Nature of distress

i) The mariner shall be able to remove individual GMDSS distress alert objects on demand.

NOTE 3 GMDSS distress alerts are not part of the Bridge Alert Management concept.

4.13 Performance tests, malfunction alerts and indications

(See 8.8.20)

(530/A13.1) *ECDIS shall be provided with means for either automatically or manually carrying out on-board tests of major functions. In case of a failure, the test shall display information to indicate which module is at fault.*

Major functions of ECDIS are: the ECDIS equipment itself, interface to electronic position fixing system, interface to the gyro compass, interface to the speed and distance measuring device, optional interface to the radar and optional interface to the AIS.

530/A13.2) *ECDIS shall provide suitable warning or indication of system malfunction.*

4.14 Back-up arrangements

(530/A14) *Adequate independent back-up arrangements shall be provided to ensure safe navigation in case of an ECDIS failure: (See F.3)*

1) *Facilities (IEC 61162-450 interface) enabling a safe take-over of the ECDIS functions shall be provided in order to ensure that an ECDIS failure does not result in a critical situation. (See 4.12.7)*

2) *A back-up arrangement shall be provided facilitating means for safe navigation of the remaining part of the voyage in case of an ECDIS failure. (See 4.12.7)*

4.15 Power supply

(See 8.9.8)

(530/A16.1) *It shall be possible to operate ECDIS and all equipment necessary for its normal functioning when supplied by an emergency source of electrical power in accordance with the appropriate requirements of SOLAS chapter II-1.*

(530/A16.2) *Changing from one source of power supply to another, or any interruption of the supply for a period of up to 45 s, shall not require the equipment to be manually re-initialized.*

The equipment is not required to remain operational during this interruption of the power supply.

4.16 Software maintenance

(See 8.10)

Adequate software maintenance arrangements shall be supported by the ECDIS manufacturer in accordance with IMO SN.1/Circ.1503. ECDIS equipment shall provide means to display on demand the current software version.

Means shall be provided to replace or install updates to software in systems aboard ship.

Manufacturers shall provide customers with timely access, at least by a website which is linked to the IHO website, to a list showing the IHO standards currently in effect for ECDIS, ECDIS application software versions, compliance status and regulatory approvals for the listed configurations/versions. The procedures for providing timely access shall be part of the recognized quality system of the manufacturer.

4.17 Quality management requirements

(See 8.11)

The equipment and documentation shall be developed, produced and written in accordance with a recognised quality procedure, for example ISO 9001 or an equivalent recognised quality standard.

NOTE See also IEC 60945 Software.

4.18 User and default settings

(See 8.12)

User and default settings may be provided as specified in IEC 62288:2021 clause 6.6.

5 Requirements contained in IHO publications related to S-57 ENC charts**5.1 Priority of chart display**

(See 8.8.6)

(S-52/2.3.2a) *Layers are required to establish the priority of data on the display. The general rule for the priority between different categories of information is given below:*

- 1) *ECDIS visual alerts/indications (for example caution, overscale);*
- 2) *HO-data: points/lines and areas plus official updates;*
- 3) *Notices to mariners, manual input and radio navigational warnings;*
- 4) *HO-caution (ENC cautions);*
- 5) *HO-colour-fill area data;*
- 6) *HO's on demand data;*
- 7) *radar information;*
- 8) *mariner's data: points/lines and areas (see 5.4.1);*
- 9) *manufacturer's data: points/lines and areas;*
- 10) *mariner's colour-fill area data.*

This list is not intended to indicate a drawing sequence, but to specify that the information content of category $n + 1$ shall not obscure the information content of category n or any higher category (i.e. $n - 1$, etc.). (S-52/2.3.2a).

5.2 Display of chart information

5.2.1 Scale and navigation purpose

(See 8.8.9)

(S-52/3.2.3(8a)) *If data from different compilation scales appears on the display, the boundary between different scales shall be clearly indicated.*

(S-52/3.1.7.2) *When the display cannot be completely covered with ENC data for the selected navigational purpose, the remaining part of the display shall be filled with data based on a more general navigational purpose (if available).*

(S-52/3.1.7(c)) *A graphical index of the navigational purpose of available data shall be shown on demand.*

(S-52/3.2.3(8b)) *Data shown on the display shall always be of the same display scale. If a compilation scale boundary is shown on the display, the information shown in the overscale area shall not be relied upon at the scale of the display. The overscale area shall be identified as specified in S-52, Annex A. (Note that this overscale identification only applies to automatic area scaling of parts of the display; it does not apply to overscaling of the entire display commanded by the mariner.)*

(S-52/3.2.3(9a)) *The IMO performance standards require an indication of scale and range as part of the display base. For display scale larger than 1:80 000: always display the 1 mile scale bar provided in the Presentation Library.*

(S-52/3.2.3(9b)) *For display scale at 1:80 000 or smaller: always display the 10 mile latitude scale provided in the Presentation Library.*

If the displayed area together with the used projection is such that scale is not uniform over the displayed area then the scale bar (more than 5 % difference in uniformity for all directions or displayed area is over latitude 70°) or latitude scale (more than 5 % difference in uniformity for latitude direction or displayed area is over latitude 70°) shall indicate the scale either at own ship location or at the centre of the displayed area. In such case a permanent indication "at own ship" or "at centre" shall be close to the scale bar or latitude scale.

5.2.2 Units and legend

(See 8.7.2)

Units to be used on ECDIS displays are defined in IEC 62288.

(S-52/2.3.1g) *A standard legend of general information relating to the cursor pick location, shall be shown on a graphic or text display. This legend shall contain as a minimum:*

- 1) *units for depth;*
- 2) *units for height;*
- 3) *scale of display;*
- 4) *data quality indicator;*
- 5) *sounding/vertical datum;*
- 6) *horizontal datum;*
- 7) *the value of the safety depth if used;*
- 8) *the value of the safety contour;*
- 9) *magnetic variation;*
- 10) *date and number of last update affecting the chart cells currently in use;*