

INTERNATIONAL STANDARD

IEC 61174

Second edition
2001-10

**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**

(<https://standards.iteh.ai>)
Document Preview

IEC 61174:2001

<https://standards.iteh.ai/catalog/standards/iec/61174/iec-61174-2001>



Reference number
IEC 61174:2001(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Further information on IEC publications

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

- **IEC Web Site** (www.iec.ch)

- **Catalogue of IEC publications**

The on-line catalogue on the IEC web site (www.iec.ch/catlg-e.htm) enables you to search by a variety of criteria including text searches, technical committees and date of publication. On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.

- **IEC Just Published**

This summary of recently issued publications (www.iec.ch/JP.htm) is also available by email. Please contact the Customer Service Centre (see below) for further information.

- **Customer Service Centre**

If you have any questions regarding this publication or need further assistance, please contact the Customer Service Centre:

Email: custserv@iec.ch
Tel: +41 22 919 02 11
Fax: +41 22 919 03 00

INTERNATIONAL STANDARD

IEC 61174

Second edition
2001-10

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

(<https://standards.iteh.ai>)
Document Preview

<https://standards.iteh.ai> IEC 61174:2001

<https://standards.iteh.ai/document-preview/standards/iec/61174/iec-61174-2001>

© IEC 2001 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission
Telefax: +41 22 919 0300

3, rue de Varembé Geneva, Switzerland
e-mail: inmail@iec.ch IEC web site <http://www.iec.ch>



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE **XD**

For price, see current catalogue

CONTENTS

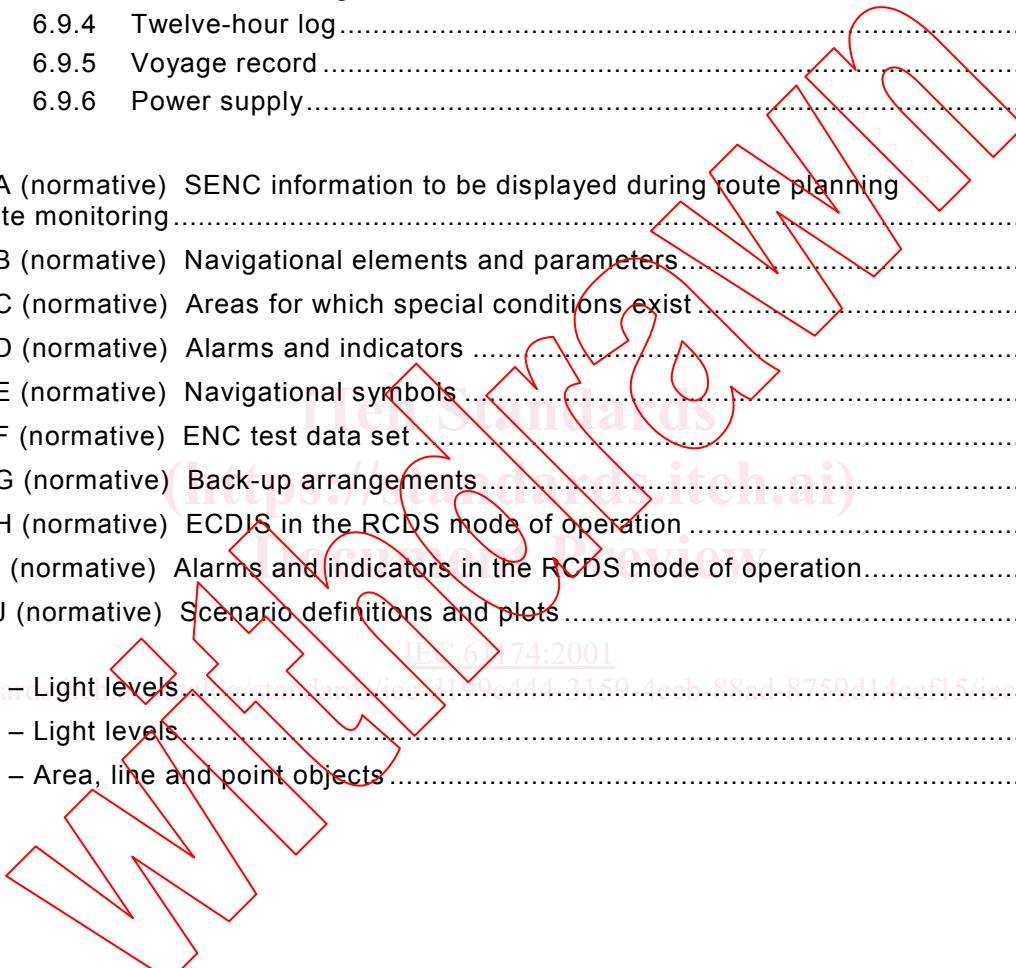
FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	8
3 Definitions and abbreviations.....	9
3.1 Definitions	9
3.2 Abbreviations	11
4 Minimum operational and performance requirements.....	12
4.1 Introduction	12
4.2 ECDIS definitions	12
4.3 Display of SENC information	13
4.4 Provision and updating of chart information	14
4.5 Scale.....	15
4.6 Display of other navigational information	15
4.7 Display mode and generation of the neighbouring area	16
4.8 Colours and symbols.....	16
4.9 Display requirements.....	16
4.10 Route planning, monitoring and voyage recording	16
4.11 Accuracy	19
4.12 Connections with other equipment (Interfaces).....	19
4.13 Performance tests, malfunction alarms and indications.....	19
4.14 Back-up arrangements	19
4.15 Power supply.....	20
5 Requirements contained in IHO special publications.....	20
5.1 Content and structure of chart data	20
5.2 Priority of chart display	20
5.3 Display of chart information.....	21
5.3.1 Scale and navigation purpose.....	21
5.3.2 Text.....	21
5.3.3 Units and legend	22
5.4 Display functions.....	22
5.4.1 Object information	22
5.4.2 Navigational information	23
5.4.3 Safety contour	23
5.4.4 Navigational calculations	23
5.5 Supplementary display functions	23
5.5.1 Additional mariner's information.....	23
5.5.2 Additional non-HO information	24
5.5.3 Tidal adjustment.....	24
5.6 Use of the presentation library.....	24
5.7 Display characteristics.....	24

5.8	Performance requirements	25
5.8.1	Redraw.....	25
5.8.2	Resolution	25
5.8.3	Number of colours	25
5.8.4	Brightness and contrast.....	26
5.9	Ergonomic requirements.....	26
5.10	Update of chart information	27
5.10.1	General	27
5.10.2	Manual update.....	28
5.10.3	Semi-automatic update.....	28
5.10.4	Reception of updates.....	28
5.10.5	Sequence check	29
5.10.6	Consistency check.....	29
5.10.7	Geographic applicability	29
5.10.8	Summary report.....	29
5.10.9	Review of ENC updates.....	29
5.10.10	Modification of updates.....	29
6	Methods of testing and required test results	29
6.1	EUT installation and technical documentation.....	29
6.2	Interfaces	30
6.3	Environmental	30
6.4	Preparation	30
6.4.1	Power-up.....	30
6.4.2	Initial ship parameters.....	30
6.4.3	Required test items	31
6.5	Initial data tests.....	31
6.5.1	Presentation library	31
6.5.2	ENC.....	31
6.6	Accuracy.....	32
6.7	Visual requirements.....	32
6.7.1	Symbols	32
6.7.2	Units and legend	32
6.7.3	Colour table.....	33
6.7.4	Resolution	35
6.7.5	Display characteristics.....	36
6.8	Functional requirements	36
6.8.1	Standard display.....	36
6.8.2	Display base.....	36
6.8.3	All other information	36
6.8.4	Display priorities.....	36
6.8.5	Additional display functions	37
6.8.6	Scale and navigation purpose.....	37
6.8.7	Mode and orientation.....	38
6.8.8	Safety contour	38
6.8.9	Safety depth	38
6.8.10	Object information	38
6.8.11	Navigation related functions	39

6.8.12	Position integration.....	39
6.8.13	Radar and plotting information.....	40
6.8.14	Loading of corrupted data.....	40
6.8.15	Automatic updates.....	40
6.8.16	Manual updates.....	41
6.8.17	Self-tests of major functions.....	42
6.9	Operational requirements.....	42
6.9.1	Ergonomic principles.....	42
6.9.2	Route planning.....	42
6.9.3	Route monitoring.....	43
6.9.4	Twelve-hour log.....	44
6.9.5	Voyage record.....	44
6.9.6	Power supply.....	44

Annex A (normative)	SENC information to be displayed during route planning and route monitoring.....	45
Annex B (normative)	Navigational elements and parameters.....	46
Annex C (normative)	Areas for which special conditions exist.....	47
Annex D (normative)	Alarms and indicators.....	48
Annex E (normative)	Navigational symbols.....	49
Annex F (normative)	ENC test data set.....	54
Annex G (normative)	Back-up arrangements.....	57
Annex H (normative)	ECDIS in the RCDS mode of operation.....	67
Annex I (normative)	Alarms and indicators in the RCDS mode of operation.....	87
Annex J (normative)	Scenario definitions and plots.....	88

Table 1 – Light levels.....	34
Table 2 – Light levels.....	35
Table 3 – Area, line and point objects.....	39



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

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

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

This second edition of IEC 61174 cancels and replaces the first edition published in 1998, of which it constitutes a technical revision.

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

FDIS	Report on voting
80/308/FDIS	80/316/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 3.

Annexes A, B, C, D, E, F, G, H, I and J form an integral part of this standard.

The committee has decided that the contents of this publication will remain unchanged until June 2004. At this date, the publication will be

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

Withdrawing

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 61174:2001](https://standards.iteh.ai/standards/iec/61174-2001)

<https://standards.iteh.ai/standards/iec/61174-2001>

INTRODUCTION

For this second edition of this International Standard, the maintenance team completed the following tasks:

- a) developed minimum operational and performance requirements for the RCDS mode of operation in accordance with appendix 7 of the IMO performance standards as amended by IMO resolution MSC.86, importing much of the text from appendix 7 to produce an unambiguous and user-friendly annex H to this standard;
- b) developed separate tests for back-up arrangements as defined by appendix 6 of the IMO performance standards (see annex G);
- c) clarified the colour tolerance requirements and created allowances for the separate testing of monitors;
- d) performed an extensive review of the standard to ensure proper referencing and language throughout.

Technical committee 80 recognizes that there is further work to be accomplished in this standard, and a future revision is anticipated within 12 to 18 months, to incorporate some critical hydrographic considerations including the RNC test data set, several S-57 definitions and tests and harmonisation of the navigation related symbols.

iTech Standards
(<https://standards.iteh.ai>)
Document Preview

IEC 61174:2001

<https://standards.iteh.ai/catalog/standards/iec/1199c444-3159-4ecb-88ad-8759d14ccf15/iec-61174-2001>

WITHDRAWN

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 A.817 as amended by annex 5 to IMO resolution MSC.64 and annex 4 to IMO resolution MSC.86.

This standard is based upon the performance standards of IMO resolution A.817, and is also associated with IMO resolution A.694 and IEC 60945. Reference is made, where appropriate, to IMO resolution A.817, and all subclauses whose wording is identical to that in the resolution are printed in italics.

In association with the above IMO resolution A.817, are the International Hydrographic Organization (IHO) special publications S-52, S-57 and S-61. 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.

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 normative documents contain provisions, which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60872-1: *Maritime navigation and radiocommunication equipment and systems – Radar plotting aids – Part 1: Automatic radar plotting aids (ARPA) – Methods of testing and required test results*

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

IEC 61162 (all parts), *Maritime navigation and radiocommunication equipment and systems – Digital interfaces*

ISO 9000 (all parts), *Quality management and quality assurance standards*

IMO Convention for safety of life at sea (SOLAS) 1997 (as amended)

IMO A.424:1979, *Performance standards for gyro-compasses*

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

IMO A.817:1995, *Performance standards for electronic chart display and information systems (ECDIS)*

IMO A.821:1995, *Performance standards for gyro-compasses for high-speed craft*

IMO A.823:1995, *Performance standards for automatic radar plotting aids (ARPAs)*

IMO A.824:1995, *Performance standards for devices to indicate speed and distance*

IMO MSC.64(67):1996, Annex 4 – *Performance standards for radar equipment*

IMO MSC.64(67):1996, Annex 5 – *Amendment to IMO A.817*

IMO MSC.86(70):1998, Annex 4 – *Amendments to IMO A.817*

IHO S-52:1996, *Specifications for chart content and display aspects of ECDIS*

IHO S-52, appendix 1:1996, *Guidance on updating the electronic navigational chart*

IHO S-52, appendix 2:1997 (as amended), *Colour and symbol specifications for ECDIS*

IHO S-52, appendix 3:1997, *Glossary of ECDIS-related terms*

IHO S-52, appendix 4: *Test data set for use with IEC 61174*

IHO S-57:1996 (as amended), *Transfer standard for digital hydrographic data*

IHO S-61:1999, *Product specification for raster navigational charts (RNC)*

3 Definitions and abbreviations

Definitions of ECDIS related terms pertaining to IMO performance standards for ECDIS are listed in 4.2. A glossary of ECDIS related terms is included in S-52, appendix 3.

For the purpose of this International Standard the following definitions and abbreviations apply.

3.1 Definitions

3.1.1

CIE colour calibration

procedure to confirm that the colour specified in S-52, appendix 2 is correctly reproduced on the ECDIS display

3.1.2

common reference system

sensor input data, providing identical and obligatory reference pertaining to position, course, heading, bearing, speed, velocity, etc. and horizontal datum to different subsystems within an integrated navigation system

3.1.3

compilation scale

scale with which the chart information meets the IHO requirements for chart accuracy. It is established by the producing hydrographic office and encoded in the ENC

3.1.4

corrupted data

ENC data produced according to the S-57 ENC product specification, but altered or modified during production, transmission, or retrieval

3.1.5

degrade

reduce the quantity or quality of information content

3.1.6

display redraw time

interval from when the display starts to change until the new display is complete

3.1.7

display regeneration time

interval from operator action until the consequent redraw is complete

3.1.8

display scale

ratio between a distance on the display and a distance on the ground, normalized and expressed as, for example, 1:10 000

3.1.9

ENC cell

geographic division of ENC data for distributing purposes. For further information, refer to the ENC product specification in S-57

3.1.10

ENC data

data conforming to 4.2.2

3.1.11

ENC test data set

standardized data set supplied on behalf of the IHO that is necessary to accomplish IEC testing requirements for ECDIS. This data set is encoded according to the S-57 ENC product specification and contains update information based on S-52, appendix 1. The specific requirements are listed in annex F

3.1.12

non-ENC data

data not conforming to 4.2.2

3.1.13

overscale

display of the chart information at a display scale larger than the compilation scale. Overscaling may arise from deliberate overscaling by the mariner, or from automatic overscaling by ECDIS in compiling a display when the data included is at various scales

3.1.14

presentation library

implementation of the display specifications in S-52, appendix 2 "Colour and Symbol Specifications for ECDIS", by de-coding and symbolizing the SENC. It contains:

- a) the ECDIS symbol library, including the IEC navigation symbols;
- b) the ECDIS colour tables for day, dusk, and night viewing;
- c) look-up tables, linking SENC objects to the appropriate colour and symbology;
- d) conditional symbology procedures for:
 - cases where symbolizing depends on circumstances, such as the mariner's choice of safety contour;
 - cases where symbolizing is too complex to be defined in a direct look-up table;
- e) description of symbology instructions;
- f) mariner's navigation objects, specified in the same format as chart objects for convenience of processing in ECDIS;
- g) supplementary features, for example ECDIS chart 1 colour differentiation test diagrams and colour calibration software.

The presentation library is available in hard-copy or in digital form. The symbols shall be replicated in size and shape, using any convenient format. The colour tables shall be reproduced within the tolerances given in S-52, appendix 2/5.2.3. The remaining items may be implemented in any convenient form which produces the same results as the presentation library.

3.1.15

single operator action

single operation shall be achieved by activating a hardkey or softkey, including any necessary cursor movement

3.1.16

RNC data

data conforming to H.2.2

3.1.17

RNC test data set

standardized data set supplied on behalf of the IHO that is necessary to accomplish IEC testing requirements for RCDS mode of operation. This data set is encoded according to the S-61 RNC product specification. Test RNCs are specified by the HO providing the RNC service or on whose behalf the RNC service is provided.

3.2 Abbreviations

AIS	Automatic identification system
ARPA	Automatic radar plotting aid
ATA	Automatic tracking aid
CIE	Comité International de l'Eclairage
EBL	Electronic bearing line
ECDIS	Electronic chart display and information system
ENC	Electronic navigational chart
EPA	Electronic plotting aid
EPFS	Electronic position-fixing system
EUT	Equipment under test
GMDSS	Global maritime distress and safety system
HO	Hydrographic office
IEC	International Electrotechnical Commission
IHO	International Hydrographic Organization
IMO	International Maritime Organization
RCDS	Raster chart display system
RNC	Raster navigational chart
SENC	System electronic navigational chart
SOLAS	Safety of life at sea
SRNC	System raster navigational chart
VRM	Variable range marker

4 Minimum operational and performance requirements

4.1 Introduction

NOTE In the following subclauses of clause 4, the text in italics is from the corresponding paragraph of the annex to IMO resolution A.817. For example, 4.1.1 is paragraph 1.1 from the annex of A.817.

4.1.1 The primary function of the ECDIS is to contribute to safe navigation.

4.1.2 ECDIS with adequate back-up arrangements may be accepted as complying with the up-to-date charts required by regulation V/20 of the 1974 SOLAS Convention.

4.1.3 In addition to the general requirements for shipborne radio equipment forming part of the global maritime distress and safety system (GMDSS) and the requirements for electronic navigational aids contained in IMO resolution A.694 (IEC 60945), ECDIS shall meet the requirements of IMO resolution A.817.

4.1.4 ECDIS shall be capable of displaying all chart information necessary for safe and efficient navigation originated by, and distributed on the authority of, government authorized hydrographic offices.

4.1.5 ECDIS shall facilitate simple and reliable updating of the electronic navigational chart.

4.1.6 Use of ECDIS shall reduce the navigational workload as compared to use of the paper chart. It shall enable the mariner to execute in a convenient and timely manner all route planning, route monitoring and positioning currently performed on paper charts. It shall be capable of continuously plotting the ship's position.

4.1.7 ECDIS shall have at least the same reliability and availability of presentation as the paper chart published by government authorized hydrographic offices.

4.1.8 ECDIS shall provide appropriate alarms or indications with respect to the information displayed or malfunction of the equipment. (See annex D.)

4.1.9 When the relevant chart information is not available in the appropriate form, some ECDIS equipment may operate in the Raster Chart Display System (RCDS) mode as defined in annex H. Unless otherwise specified in annex H, the RCDS mode of operation shall conform to performance standards not inferior to those set out in IMO resolution A.817.

4.2 ECDIS definitions

For the purpose of this standard:

4.2.1 Electronic chart display and information system (ECDIS) means a navigation information system which with adequate backup arrangements can be accepted as complying with the up-to-date chart required by regulation V/20 of the 1974 SOLAS Convention, by displaying selected information from a system electronic navigational chart (SENC) with positional information from navigation sensors to assist the mariner in route planning and route monitoring, and by displaying additional navigation-related information.

The reference geodetic datum is WGS-84.