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**Maritime navigation and radiocommunication
equipment and systems – Radar –**

**Part 3:
Radar with chart facilities –
Performance requirements –
Methods of testing and required test results**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MARITIME NAVIGATION AND RADIOCOMMUNICATION
EQUIPMENT AND SYSTEMS – RADAR –**
**Part 3: Radar with chart facilities – 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.
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International Standard IEC 60936-3 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

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

FDIS	Report on voting
80/337/FDIS	80/342/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 and C form an integral part of this standard.

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

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- withdrawn;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

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – RADAR –

Part 3: Radar with chart facilities – Performance requirements – Methods of testing and required test results

1 Scope

This part of IEC 60936 specifies the minimum operational and performance requirements, methods of testing and required test results conforming to performance standards not inferior to those adopted by the IMO in Resolution MSC.64(67) Annex 4 Radar clauses 3.3.9 and 3.3.10 for the optional requirements for superimposition of selected parts of SENC information. In addition it takes account of IMO Resolution A.694 and is associated with IEC 60945. When a requirement of this standard is different from IEC 60945, the requirement in this standard shall take precedence.

A High Speed Craft (HSC) radar, as defined in IEC 60936-2, that uses 'selected parts of the SENC' shall comply with the requirements of this standard.

This standard does not include the mandatory performance requirements for the shipborne radar or HSC radar. These are specified in IEC 60936-1, Shipborne radar, and IEC 60936-2, HSC radar respectively.

All text in this standard, whose wording is identical to that in IMO Resolution MSC.64(67) Annex 4 is printed in *italics* and the Resolution (abbreviated to – A4) and paragraph numbers are indicated in brackets, i.e. (A4/3.3).

2 Normative references

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

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 60872-2, *Maritime navigation and radiocommunication equipment and systems – Radar plotting aids – Part 2: Automatic tracking aids (ATA) – Methods of testing and required test results*

IEC 60872-3, *Maritime navigation and radiocommunication equipment and systems – Radar plotting aids – Part 3: Electronic plotting aid (EPA) – 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 60936-1, *Maritime navigation and radiocommunication equipment and systems – Radar – Part 1: Shipborne radar – Performance requirements – Methods of testing and required test results*

IEC 60936-2, *Maritime navigation and radiocommunication equipment and systems – Radar – Part 2: Shipborne radar for high-speed craft (HSC)– Methods of testing and required test results*

IEC 61162, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces*

IEC 61174, *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*

IMO Convention for the Safety of Life at Sea (SOLAS) as amended

IMO Resolution MSC.64(67) Annex 4 *Recommendation on performance standards for radar equipment.*

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

IMO Resolution A.820(19), *Performance standards for navigational radar equipment for high-speed craft*

IMO Resolution A.817(19), *Performance standards for electronic chart display and information systems*

IHO S52 and appendices

3 Definitions and abbreviations

For the purposes of this part of IEC 60936 the following definitions and abbreviations apply.

3.1 Definitions

3.1.1

ECDIS

IEC 61174 '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. It displays selected information from a system electronic navigational chart (SENC) with positional information from navigational 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

3.1.2

SENC

System Electronic Navigational Chart (SENC) means a database resulting from the transformation of the ENC for appropriate use, updates to the ENC by appropriate means, and other data added by the mariner. It is this database that is actually accessed for the display generation and other navigational functions, and which is the equivalent to an up-to-date paper chart. The SENC may also contain information from other sources

3.1.3**ENC**

Electronic Navigation Chart (ENC) means the database, standardized as to content, structure and format, issued for use with ECDIS on the authority of government authorized hydrographic offices. The ENC contains all the chart information necessary for safe navigation and may contain supplementary information in addition to that contained in the paper chart (e.g. sailing directions) which may be considered necessary for safe navigation. The content, structure and format of the ENC are specified in IHO S-57 Edition 3 including the associated ENC product specification

3.1.4**ENC test data set**

a standardized data set supplied on behalf of the International Hydrographic Organisation (IHO) that is necessary to accomplish IEC testing requirements for ECDIS. This test data set is encoded according to the IHO S-57 ENC product specification and contains update information based on IHO S-52 appendix 1. The specific requirements are listed in IEC 61174 annex F

3.1.5**consistent 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 sub-systems within an integrated navigation system

3.1.6**degrade**

reduce the information content of

3.1.7**primary chart-information set**

coastlines, own ship's safety contour, dangers to navigation and fixed and floating aids to navigation, as further detailed in IMO Resolution A.817 Appendix 2 clauses 1.1, 1.2, 1.3, 1.4 and 2.3 only. See annex A of this standard for the specification of chart symbols and features, to be used.

3.2 Abbreviations

ECDIS	Electronic chart display and information system
ENC	Electronic navigation chart
EPFS	Electronic position fixing system
EUT	Equipment under test
HSC	High speed craft
IHO	International Hydrographic Organisation
SENC	System electronic navigational chart
TM	True motion
N UP	North up

4 Performance requirements**4.1 General**

The performance of the shipborne radar (or HSC radar) shall not be inferior to the performance requirements adopted by the IMO in MSC.64(67) Annex 4 Radar (or A.820(19) HSC radar) as specified in IEC 60936-1 and IEC 60936-2 respectively.

4.1.1 Quality assurance

The Administration shall require that the manufacturers have a quality control system audited by a competent authority to ensure continuous compliance with the type approval conditions (SOLAS Chapter V / Regulation 18.5).

4.2 Display requirements

4.2.1 Display conflict

It shall not be possible for radar maps to be displayed at the same time as SENC navigational information. However, the navigational lines, other than those used for maps, and symbols given in IEC 60936-1, annex C, clauses C.3, C.4 and C.5 are permitted, provided there is no conflict between these sets of information.

Raster nautical charts (RNC) are not applicable for chart radar.

4.2.2 Display size

The equipment shall provide, without external magnification, a daylight display with a radar minimum effective diameter within the bearing scale of not less than 250 mm.

4.2.3 Display resolution

The display shall have a minimum resolution of (L) lines per mm given by $L = 800/s$, where s is the smaller dimension of the SENC information area. (e.g. for the minimum chart area, $s = 250$ mm and the resolution $L = 3,20$ lines per mm, giving a picture unit size of 0,312 mm.)

4.2.4 Display colour

The display shall be multi-colour. The colours used for navigational lines and symbols and the SENC information shall harmonize. The SENC information is permitted to be in shades of grey.

4.3 Display of SENC information

4.3.1 Display degradation (A4/3.3.9)

Selected parts of the System Electronic Navigation Chart (SENC) information shall be displayed in such a way that the radar and plotting information is not masked, obscured or degraded

4.3.2 SENC information brilliance

The SENC information brilliance shall be adjustable by the user at any time.

4.3.3 Display functionality and response time

The radar functionality and response time shall not be adversely affected by the SENC information.

4.3.4 Primary chart-information set

The SENC information made available for use on a radar display shall at least include coastlines, own ship's safety contour, dangers to navigation and fixed and floating aids to navigation. This set of information shall be known as the 'primary chart-information set'.

The radar shall be capable of displaying the 'primary chart-information set' of SENC information. Any additional SENC information as specified by the manufacturer shall meet the requirements of this standard.

The radar shall present the 'primary chart-information set' of SENC required at any time by dedicated controls or primary access in an associated menu.

4.3.5 Selection of parts of SENC for display

From the radar display *the mariner shall be able to select those parts of the SENC, which can be made available and the mariner requires to be displayed.*

The selected parts of SENC shall be displayed with minimum reduction of the information content.

It shall be possible to suppress or remove all SENC information with a momentary control function and it shall be possible to remove all SENC information from the radar display at any time by a dedicated control or primary access in an associated menu.

It shall be possible to remove or add categories of the SENC information made available to the radar. The addition or deletion of information shall be limited to categories of information, for example prohibited and restricted areas, spot soundings, etc., but not individual items such as individual area or an individual sounding. Full details and relevant safety cautions, shall be provided in the operator's handbook.

If a facility has been provided to call up information associated with an object by cursor enquiry on its symbol, then the data shall be presented outside the radar video area. Where this facility is provided, the text shall not appear automatically whenever the object with which it is associated appears on the display. If depth information is displayed, it shall only be presented as it has been provided in the ENC and not adjusted by tidal height.

4.4 Superimposition (A4/3.3.10)

For the superimposition of selected parts of the SENC:

4.4.1 Reference management

Reference management is required to ensure that the information displayed is correlated and in the same reference and co-ordinate system;

A consistent common reference of position (with a datum of WGS84), including antenna positions, heading and speed shall be used. The operations manual shall contain appropriate information including the expected tolerance (uncertainty) of the chart to radar picture.

4.4.2 Display area

The whole effective radar display area shall contain the available radar and SENC information. The SENC information shall not be displayed outside this area, unless there is a clear indication of the radar display area limit, for example bearing scale.

4.4.3 Matching and adjustment

In case of any deviations between the chart image and the radar image through detectable causes, manual adjustment of the SENC shall be possible. Any manual adjustment shall be clearly indicated as long as it is activated. Resetting shall be possible in a simple manner.

- a) The SENC information shall match within appropriate tolerances the range scale, orientation and projection of the radar information.
- b) The radar with chart facilities shall provide an indication if the SENC information is displayed at a larger scale than contained in the ENC.