

INTERNATIONAL STANDARD

IEC
60936-1

First edition
1999-12

Maritime navigation and radiocommunication equipment and systems – Radar –

Part 1: Shipborne radar – Performance requirements – Methods of testing and required test results

*Matériels et systèmes de navigation et de
radiocommunication maritimes – Radars –*

*Partie 1:
Radars de navire – Exigences de fonctionnement –
Méthodes d'essai et résultats d'essai exigés*

© IEC 1999 — 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

CONTENTS

	Page
FOREWORD	4
Clause	
1 Scope	6
2 Normative references	6
3 Performance requirements	7
3.1 (A4/1) Introduction	8
3.2 (A4/2) General	8
3.3 (A4/3.1) Range performance	8
3.4 (A4/3.2) Minimum range	8
3.5 (A4/3.3) Display	9
3.6 (A4/3.4) Range measurement	10
3.7 (A4/3.5) Heading indication (heading line)	10
3.8 (A4/3.6) Bearing measurement	11
3.9 (A4/3.7) Discrimination	12
3.10 (A4/3.8) Roll or pitch	12
3.11 (A4/3.9) Antenna scan	12
3.12 (A4/3.10) Azimuth stabilisation	12
3.13 (A4/3.11) Performance monitoring	13
3.14 (A4/3.12) Anti-clutter devices	13
3.15 (A4/3.13) Operation	13
3.16 (A4/3.14) Operation with radar beacons and SARTs	14
3.17 (A4/3.15) Display modes	14
3.18 (A4/3.16) Interference from magnetic fields	15
3.19 (A4/3.17) Radar installation	15
3.20 (A4/3.18) Failure warnings (alarms) and status indications	15
3.21 (A4/4) Multiple radar installations	16
3.22 (A4/5) Interface	16
3.23 (A4/6) Navigational information	16
3.24 (A4/7) Plotting	17
3.25 Standard names – abbreviations and symbols	17
3.26 (A4/8) Ergonomics	17
3.27 Safety precautions	18
4 Methods of testing and required test results	18
4.1 General conditions of measurement and definitions	19
4.2 Power supply, cabling distances and technical information	20
4.3 (3.3) Range performance	20
4.4 (3.4) Minimum range	21
4.5 (3.5) Display	21
4.6 (3.6) Range measurement	22
4.7 (3.7) Heading indicator (heading line)	22
4.8 (3.8) Bearing measurement	22
4.9 (3.9) Discrimination	23

Clause	Page
4.10 (3.10) Roll and pitch performance	25
4.11 (3.11) Antenna scan	25
4.12 (3.12) Azimuth stabilisation.....	26
4.13 (3.13.1) Performance monitor check	26
4.14 (3.14) Anti-clutter devices	27
4.15 (3.15) Operation	27
4.16 (3.16) Operation with radar beacons and SARTs	28
4.17 (3.17) Display modes.....	28
4.18 (3.18) Interference from external magnetic fields	28
4.19 (3.19) Radar installation	29
4.20 (3.20) Failure warnings (alarms) and status indications	29
4.21 (3.21) Multiple radar installations.....	29
4.22 (3.22) Interface	29
4.23 (3.23) Navigational information	30
4.24 (3.24) Plotting.....	30
4.25 (3.25) Standard names - abbreviations and symbols.....	30
4.26 (3.26) Ergonomics	31
4.27 (3.27) Safety precautions.....	31
4.28 (3) Spurious emissions	31
4.29 (3.9.3) Antenna horizontal radiation pattern.....	31
Annex A (normative) Method for relating the radar cross-section (echoing area) of one radar target with another	33
Annex B (normative) Standard names, abbreviations and symbols for control functions on marine navigational radar equipment.....	38
Annex C (normative) Guidelines for the display of navigational information on radar by means of radar maps	50
Annex D (normative) Measurement methods for spurious emissions	58
Annex E (informative) Performance checks during environmental testing.....	59

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT
AND SYSTEMS – RADAR –****Part 1: Shipborne radar – 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 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 60936-1 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

The IEC 60936 series, of which this is part 1, replaces IEC 60936 published in 1988, in order to reflect the new requirements of the International Maritime Organization (IMO). This part of the series contains some of the IMO specific requirements.

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

FDIS	Report on voting
80/235/FDIS	80/249/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 and D form an integral part of this standard.

Annex E is for information only.

A bilingual version of this standard may be published at a later date.

The committee has decided that this publication remains valid until 2003.

At this date, in accordance with the committee's decision, the publication will be

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

NOTE Annex C.5.2.2 of this standard contains symbols for the display of AIS-targets. Due to the fact that AIS is a new navigation system, the process of the evaluation of different proposals for the presentation of AIS information on the bridge is still ongoing. A final decision about AIS presentation can only be drawn after functional and operational evaluation of related research projects. In this respect the symbols for AIS targets given in Annex C.5.2.2 No. 2.3, 2.4, 2.5 are provisional and subject of future decision.

Withdrawn

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – RADAR –

Part 1: Shipborne radar – Performance requirements – Methods of testing and required test results

1 Scope

This International Standard specifies the minimum performance requirements, methods of testing and required test results for conformance to performance standards not inferior to those required by IMO resolution MSC.64 (67), Annex 4. 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 that of IEC 60945, the requirement in this standard shall take precedence.

This standard does not include the optional performance requirements for superimposition of selected parts of SENC information. These are specified in IEC 60936-3.

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, for example (A4/3.3).

2 Normative references

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this part of IEC 60936. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60936 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 documents referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

IEC 60872-1:1998, *Maritime navigation and radiocommunication equipment and systems – Radar plotting – Part 1: Automatic radar plotting aids (ARPA) – Methods of testing and required test results*

IEC 60872-2:1999, *Maritime navigation and radiocommunication equipment and systems – Radar plotting – 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 – Part 3: Electronic plotting aid (EPA)*¹⁾

IEC 60936-3, *Maritime navigation and radiocommunication equipment and systems – Radar – Part 3: Shipborne radar with chart facilities – Methods of testing and required test results*¹⁾

IEC 60945:1996, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

IEC 61023:1999, *Maritime navigation and radiocommunication equipment and systems – Marine speed and distance measuring equipment (SDME). Performance requirements – Methods of testing and required test results*

¹⁾ To be published.

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

IEC 61174:1998, *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*

IEC 61209:1999, *Maritime navigation and radiocommunication equipment and systems – Integrated bridge systems (IBS) – Operational and performance requirements, methods of testing and required test results*

IEC 61996, *Maritime navigation and radiocommunication equipment and systems – Shipborne voyage data recorder (VDR) – Performance requirements – Methods of testing and required test results¹⁾*

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

IMO A.477:1981, *Performance standards for radar equipment*

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.823:1995, *Performance standards for automatic radar plotting aids*

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

IMO A.861:1997, *Performance standards for shipborne voyage data recorders (VDRs)*

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

IMO MSC SN/Circular 197:1997, *Operation of marine radar for SART detection*

IMO:1997, *International Convention for the Safety of Life at Sea (SOLAS) Consolidated edition*

ITU:1997, *Radio Regulations*

ITU-R M.628-3:1994, *Technical characteristics for search and rescue radar transponders*

ITU-R M.824-2:1995, *Technical parameters of radar beacons (RACONS)*

ITU-R M.1177-1:1997, *Techniques for measurement of spurious emissions of radar systems*

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

¹⁾ To be published.