



INTERNATIONAL STANDARD

**Maritime navigation and radiocommunication equipment and systems –
Shipborne radar – Performance requirements, methods of testing and required
test results**

Withhold

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE

XH

CONTENTS

FOREWORD.....	11
1 Scope.....	13
1.1 Purpose	13
1.2 Application of these standards.....	14
1.3 Equipment categories.....	14
2 Normative references	15
3 Terms and definitions	16
4 General	25
4.1 Establishing equipment type and status.....	25
4.2 Conditions of measurement and related definitions.....	26
4.3 Test sites and simulation.....	26
4.3.1 Environmental and RF testing.....	26
4.3.2 Over-sea radar performance tests	26
4.3.3 Test targets and target simulation for performance tests.....	27
4.4 Quality requirements	27
4.5 Test terminology and format.....	27
4.5.1 General	27
4.5.2 Test requirement terminology	27
4.5.3 Testing method terminology.....	28
5 Radar performance.....	28
5.1 General.....	28
5.2 Transmission and interference.....	28
5.2.1 Transmission frequency.....	28
5.2.2 Interference.....	29
5.3 Performance optimisation and monitoring.....	29
5.3.1 General	29
5.3.2 Optimum performance	29
5.4 Gain and anti-clutter functions.....	30
5.4.1 General.....	30
5.4.2 Gain function	30
5.4.3 Manual and automatic sea anti-clutter	31
5.4.4 Rain anti-clutter	31
5.5 Signal processing.....	31
5.5.1 General	31
5.5.2 Target enhancement.....	31
5.5.3 Radar signal correlation.....	32
5.5.4 Signal processing and radar image latency.....	32
5.5.5 Second-time-around echoes	33
5.5.6 Transmission format	33
5.5.7 Picture update	33
5.5.8 Additional processing	33
5.5.9 Signal processing description	34
5.6 Operation with SARTs, target enhancers (RTEs) and beacons	34
5.6.1 General	34
5.6.2 Radar beacons, SARTs and enhancers	34

5.7	Minimum range and range compensation	35
5.7.1	General	35
5.7.2	Range compensation	35
5.7.3	Minimum range	35
5.8	Range and bearing discrimination	36
5.8.1	General	36
5.8.2	Measurement conditions	36
5.8.3	Range discrimination	36
5.8.4	Bearing discrimination	37
5.8.5	Fundamental radar accuracy	37
5.9	Target detection performance assessment	37
5.9.1	General	37
5.9.2	Range of first detection in minimal clutter	38
5.9.3	Assessment of target detection with clutter	40
5.9.4	Radar performance documentation	46
5.10	Radar antenna (including pitch and roll)	47
5.10.1	General	47
5.10.2	Vertical radiation pattern/pitch and roll	47
5.10.3	Antenna horizontal pattern	47
5.10.4	Antenna side lobes	48
5.11	Radar availability	49
5.11.1	Standby and transmit	49
6	Display presentation	49
6.1	General	49
6.2	Performance standards	49
6.3	Presentation of information	50
6.3.1	Consistency of layout	50
6.3.2	Consistency of presentation	50
6.3.3	Separation of operational display area	51
6.3.4	Operational display area information	51
6.4	Readability	51
6.4.1	Readability under all ambient light conditions	51
6.4.2	Legibility of alphanumeric data, information and text	53
6.4.3	Presentation of text	54
6.4.4	Icons	54
6.5	Colours and intensity	54
6.5.1	Use and discrimination of colour	54
6.6	Symbols	56
6.6.1	Operational information	56
6.7	Coding of information	56
6.7.1	Colour coding of alarm-related information	56
6.7.2	Colour coding in combination with other attributes	56
6.7.3	Flashing of information	57
6.8	Integrity marking	57
6.8.1	Indication of source, validity and integrity status	57
6.8.2	Colour coding of validity and integrity	57
6.9	Alarms and indications	58
6.9.1	Operational status	58
6.9.2	List of alarms	58

6.9.3	Alarm related information from multiple sources	59
6.10	Presentation of radar information	59
6.10.1	Radar video images.....	59
6.10.2	Linearity and index delay.....	60
6.11	Physical requirements	61
6.11.1	Operational display area.....	61
6.11.2	Contrast and brightness adjustment.....	61
6.11.3	Temporal stability	62
6.11.4	Physical controls and status indicators	62
6.12	Colours	63
6.12.1	Requirement.....	63
6.12.2	Method of test and required results	63
6.13	Screen resolution	63
6.13.1	Requirement.....	63
6.13.2	Methods of test and required results.....	63
6.14	Screen viewing angle	64
6.14.1	Requirement.....	64
6.14.2	Methods of test and required results.....	64
6.15	Magnetic interference.....	64
6.15.1	Requirement.....	64
6.15.2	Methods of test and required results.....	64
7	CCRP and own ship	64
7.1	Consistent common reference point (CCRP)	64
7.1.1	CCRP position.....	64
7.1.2	Measurements.....	65
7.1.3	Antenna offset.....	65
7.2	Own ship.....	66
7.2.1	General.....	66
7.2.2	Own ship's outline and minimised symbol.....	66
7.2.3	Heading line.....	66
7.2.4	Stern line.....	67
8	Navigation tools.....	67
8.1	General.....	67
8.1.1	Units of measurement.....	67
8.1.2	Presentation.....	68
8.2	Display range scales	68
8.2.1	Mandatory range scales	68
8.3	Variable range marker (VRM).....	69
8.3.1	General	69
8.3.2	VRM measurements	69
8.4	Electronic bearing line (EBL).....	70
8.4.1	General	70
8.4.2	EBL measurements	70
8.4.3	EBL origin position	70
8.5	Cursor.....	71
8.5.1	General	71
8.5.2	Cursor measurement.....	71
8.5.3	Selection by cursor.....	72
8.6	Offset measurement of range and bearing.....	72

8.6.1	General	72
8.6.2	Electronic range/bearing line (ERBL)	72
8.7	Parallel index lines (PI)	73
8.7.1	General	73
8.7.2	PI lines and positioning	73
8.8	Bearing scale	73
8.8.1	General	73
8.8.2	Bearing scale presentation	74
8.9	Range rings	74
8.9.1	General	74
8.9.2	Range ring presentation and measurement	74
8.10	Radar maps	75
8.10.1	General	75
8.10.2	Map functions and display simple user-defined maps	75
8.10.3	Map memory and transfer	76
8.10.4	Map presentation properties	76
8.11	Navigation routes	76
8.11.1	General	76
8.11.2	Route display and monitoring	76
9	Orientation, motion and stabilisation	77
9.1	General	77
9.2	Azimuth stabilisation	77
9.2.1	Accuracy of alignment	77
9.2.2	Heading readout and reference	78
9.2.3	Azimuth stabilisation update	79
9.3	Motion and orientation modes	79
9.3.1	General	79
9.3.2	True and relative motion	79
9.4	Off-centring	79
9.4.1	General	79
9.4.2	Manual and automatic off-centring	79
9.4.3	Automatic reset	80
9.4.4	Display orientation	80
9.5	Ground and sea stabilisation	81
9.5.1	Mode and source	81
9.5.2	Ground stabilisation	81
9.5.3	Sea stabilisation	82
10	Aids for collision avoidance	82
10.1	General	82
10.2	Target trails and past positions	83
10.2.1	General	83
10.2.2	Time and plot requirements	83
10.2.3	Trails/past position availability	84
10.3	Target tracking (TT)	84
10.3.1	General	84
10.3.2	Presentation of targets	85
10.3.3	Tracking calculations	85
10.3.4	Target tracking availability	86
10.3.5	Classification and tracked target capacity	86

10.3.6	Manual acquisition	87
10.3.7	Automatic acquisition	87
10.3.8	Motion trend.....	88
10.3.9	Visibility of 50 %	88
10.3.10	Tracking algorithm	88
10.3.11	Target swap	88
10.3.12	Cease tracking	89
10.3.13	Target tracking scenarios	89
10.3.14	Target motion and tracking accuracy.....	89
10.3.15	Tracker range and bearing accuracy	97
10.3.16	Reference target	98
10.4	Tracking limitations	99
10.4.1	Tracking warnings	99
10.4.2	Documentation	99
10.5	Automatic identification system	99
10.5.1	General	99
10.5.2	AIS target capacity	100
10.5.3	Filtering of AIS sleeping targets	101
10.5.4	Activation and deactivation of AIS targets	101
10.5.5	AIS functionality and presentation	102
10.6	Radar and AIS target data	104
10.6.1	General	104
10.6.2	Bow crossing range and time (BCR/BCT)	105
10.7	Operational target alarms	105
10.7.1	General	105
10.7.2	CPA and TCPA	105
10.7.3	New target alarm	106
10.7.4	Lost tracked radar target	106
10.7.5	Lost AIS target criteria	107
10.8	Target association	108
10.8.1	General	108
10.8.2	Association and priority	108
10.9	Trial manoeuvre	112
10.9.1	General	112
10.9.2	Trial functions	112
11	Chart radar (optional classification)	113
11.1	General	113
11.1.1	Chart operation and source	114
11.1.2	Chart elements and availability	114
11.1.3	Chart reference	115
11.1.4	Primary chart information set	115
11.1.5	Chart stabilisation and chart redraw	116
11.1.6	Chart position and latency	117
11.1.7	Matching and adjustment	117
11.1.8	Chart symbols, colours, and size	118
11.1.9	Chart display size	119
11.1.10	Chart alarms and indications	119
11.1.11	Chart malfunction	119
11.1.12	Chart radar malfunction	120

11.2	Additional requirements for standalone radar with chart facilities	120
11.2.1	General	120
11.2.2	Provision and updating of chart information	120
11.2.3	Content and structure of chart data	120
12	Ergonomic criteria (control functions and display)	121
12.1	General	121
12.1.1	Operational controls	121
12.1.2	Primary controls	122
12.1.3	Control properties	122
13	Interfacing	123
13.1	General	123
13.2	Input interfacing	123
13.2.1	Input data	123
13.2.2	Input quality, integrity and latency	123
13.3	Output interfacing	124
13.3.1	Output format	124
13.3.2	Output target data	124
13.3.3	VDR interface	125
14	Design, servicing and installation	125
14.1	General	125
14.1.1	Fault diagnosis and servicing	125
14.1.2	Display design	126
14.2	Transceiver design	126
14.2.1	General	126
14.2.2	Sector blanking	127
14.3	Antenna design	127
14.3.1	Requirement	127
14.3.2	Methods of test and required results	127
14.4	Inter-switched and multiple radars	128
14.4.1	General	128
14.4.2	System safeguards	128
14.4.3	Combining radar	128
14.4.4	Multiple radar system status	129
14.5	Multiple operational displays	129
14.5.1	Additional information and conformity	129
14.6	Safety – antenna and radiation	130
14.6.1	General	130
14.6.2	Antenna radiation and rotation	130
14.6.3	Microwave radiation levels	130
15	Alarms and failures	131
15.1	General	131
15.1.1	Alarms and indications	131
15.1.2	Alarm outputs	131
15.1.3	Picture freeze	132
15.1.4	Sensor failure alarm	132
15.2	Backup and fallback arrangements	132
15.2.2	Failure of heading information (azimuth stabilisation)	132
15.2.3	Failure of speed through the water information	133

15.2.4	Failure of course and speed over ground information.....	133
15.2.5	Failure of position input information	133
15.2.6	Failure of radar video input information	133
15.2.7	Failure of AIS input information	134
15.2.8	Failure of an integrated or networked system	134
16	Environmental testing	134
16.1	General	134
16.1.1	Testing to IEC 60945	134
16.2	Additional environmental tests	135
16.2.1	General	135
16.2.2	Antenna shock test	135
17	Equipment familiarisation and documentation	136
17.1	General	136
17.1.1	User requirements	136
17.2	Instructions and documentation	136
17.2.1	General	136
17.2.2	Documentation	137
17.2.3	Operating instructions	137
17.3	Radar system installation	138
Annex A (informative)	Guidelines for radar functionality on navigation displays.....	139
Annex B (normative)	Unwanted emissions of radar systems	140
Annex C (informative)	Radar target size (RCS) and detection range calculations	145
Annex D (informative)	Factors that influence target detection	149
Annex E (normative)	Sensor errors	158
Annex F (informative)	Target scenario simulator/reported target simulator	160
Annex G (informative)	Tracked and reported target states	161
Annex H (normative)	IEC 61162 sentence formats	162
Annex I (normative)	Radar control function/indication grouping	172
Annex J (normative)	Presentation colours and symbols	176
Annex K (normative)	Colour calibration for chart radar	200
Figure 1	– Reduction of range to first detection due to rain at S-band	41
Figure 2	– Reduction of range to first detection due to rain at X-band	42
Figure 3	– TT scenario 1	91
Figure 4	– TT scenario 2	93
Figure 5	– TT scenario 3	94
Figure 6	– TT scenario 4	95
Figure 7	– TT scenario 5	96
Figure B.1	– B ₄₀ falls within the allocated band	143
Figure B.2	– B ₄₀ falls outside the allocated band	144
Figure C.1	– Enhancement by reflection (dB) over free-space (9,41 GHz).....	148
Figure C.2	– Enhancement by reflection (dB) over free-space (3,05 GHz).....	148
Figure D.1	– Effect of sea spikes on target detection	151
Figure D.2	– Multi-path plots for S-band.....	153

Figure D.3 – Multi-path plot for X-band	153
Figure G.1 – Tracked target states.....	161
Figure G.2 – AIS target states.....	161
Table 1 – Performance requirements for categories of ship/craft for SOLAS V	15
Table 2 – Range of first detection in clutter-free conditions	39
Table 3 – X-band pass/fail assessment criteria	45
Table 4 – S-band pass/fail assessment criteria	45
Table 5 – Pass/fail assessment.....	45
Table 6 – Douglas sea state parameters	46
Table 7 – Main horizontal beam pattern	48
Table 8 – Effective side-lobes	48
Table 9 – Ambient light conditions	52
Table 10 – Operational alarm status	58
Table 11 – Tracked target capacity (subset of Table 1).....	86
Table 12 – Typical tracked target accuracy (95 % probability figures)	90
Table 13 – TT scenario 1, with sensor errors applied.....	90
Table 14 – TT scenario 1, times of measurement task	91
Table 15 – TT scenario 1, accuracies after 1 min and 3 min (all ± values).....	92
Table 16 – TT scenario 2, own ship turning through ± 180°.....	92
Table 17 – TT scenario 3, initial target data.....	93
Table 18 – TT scenario 4, initial target data for fast targets (standard speed ships)	94
Table 19 – TT scenario 4, initial target data for fast targets (HSC).....	94
Table 20 – TT scenario 5: initial target data for standard craft.....	95
Table 21 – TT scenario 5: initial target data for collision scenario for HSC	96
Table 22 – Measurement points and results at 3 min and 6 min for HSC	96
Table 23 – Measurement points and results at 11 min and 14 min for HSC	97
Table 24 – Measurement points and results at 3 min and 6 min for standard craft.....	97
Table 25 – Measurement points and results at 11 min and 14 min for standard craft.....	97
Table 26 – Measurement of tracked target accuracy	98
Table 27 – AIS target display capacity (subset of Table 1).....	100
Table 28 – AIS reporting rates	107
Table 29 – Association scenario 1, initial TT and AIS target position and data	109
Table 30 – Association scenario 1, AIS target data for diverging and converging tracks.....	110
Table 31 – Association scenario 2, initial TT and AIS target position and data	110
Table 32 – Association scenario 2, AIS target data for changing speed.....	111
Table 33 – Association scenario 3, TT and AIS target start position and data	111
Table 34 – Association scenario 4, initial TT and AIS target position and data	112
Table 35 – Association scenario 4, TT and AIS target with the same course and speed	112
Table 36 – Antenna shock test severity (half sine pulse).....	135
Table B.1 – Measurement frequency ranges	141
Table D.1 – Spread of RCS values for typical ships	150
Table D.2 – S-band performance predictions ($P_{fa} = 10^{-4}$) for ranges of 0,2, 0,4, 0,7 NM....	152

Table D.3 – X-band performance predictions ($P_{fa} = 10^{-4}$) for ranges of 0,2, 0,7 NM	152
Table D.4 – Parameters for attenuation in uniform rain conditions.....	154
Table D.5 – Typical values for attenuation and backscatter in uniform rain conditions.....	154
Table D.6 – Additional radar system parameters (X/S-band).....	154
Table D.7 – Target size, height and RCS values	155
Table D.8 – S-band radar parameters (LP)	156
Table D.9 – X-band radar parameters (LP)	157
Table H.1 – Mandatory IEC 61162-1 sentences	162
Table H.2 – Tracked target data structure	164
Table H.3 – Description of terms.....	165
Table H.4 – Header format.....	166
Table H.5 – Package data format.....	168
Table I.1 – Top-level grouping of data and control functions for radar applications.....	172
Table I.2 – Icons for common function controls	173
Table J.1 – Features and colours to be used for radar maps.....	178
Table J.2 – Own ship symbols	178
Table J.3 – Radar and AIS symbols	183
Table J.4 – Navigation symbols	193
Table J.5 – Navigation tools.....	198
Table J.6 – Other symbols	199

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS –

Shipborne radar – Performance requirements, methods of testing and required test results

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62388 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

This standard replaces all the IEC 60936 (radar) and IEC 60872 (plotting) series of standards. Contents from the previous radar series (IEC 60936-1, IEC 60936-2, IEC 60936-3 and IEC/PAS 60936-5) and plotting series (IEC 60872-1, IEC 60872-2 and IEC 60872-3) of standards have been included as appropriate in this standard.

This standard supports the new IMO performance standards for shipborne radar, Resolution MSC.192(79) adopted by the IMO in December 2004. Resolution MSC.192(79) supersedes all previous IMO resolutions relating to radar and plotting, including IMO Resolutions A.278(VIII), A.477(XII) and MSC 64(67) Annex 4.

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

FDIS	Report on voting
80/494/FDIS	80/504/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.

A bilingual version of this publication may be issued at a later date.

Withdrawn

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS –

Shipborne radar – Performance requirements, methods of testing and required test results

1 Scope

This International Standard 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.192(79).

(MSC.192/2) *The radar installation, in addition to meeting the general requirements as set out in resolution A.694(17) and the related general standard, IEC 60945, should comply with the performance standards of MSC.192(79). When a requirement of this standard is different from IEC 60945 the requirement in this standard takes precedence.*

All text in this standard with wording identical to that in IMO resolution MSC.192(79) is printed in italics. Reference to MSC.192(79) is by the relevant requirement clause as indicated in brackets, for example (MSC.192/4.2.3). Some clauses from Resolution MSC.192(79) may be split and the requirements in this case are addressed separately.

(MSC.192/5) *The design and performance of the radar should be based on user requirements and up-to-date navigational technology. It should provide effective target detection within the safety-relevant environment surrounding own ship and should permit fast and easy situation evaluation.*

(MSC.192/1) *The radar equipment should assist in safe navigation and in avoiding collision by providing an indication, in relation to own ship, of the position of other surface craft, obstructions and hazards, navigation objects and shorelines. For this purpose, radar should provide the integration and display of radar video, target tracking information, positional data derived from own ship's position (EPFS) and geo referenced data.*

The integration and display of AIS information should be provided to complement radar. The capability of displaying selected parts of Electronic Navigation Charts (ENC) and other vector chart information may also be provided to aid navigation and for position monitoring. Radar is a technology that should be applied together with other sensor information applicable for the task in hand.

NOTE Radar is a system and its performance is a factor of all of its component parts. The type test should include the radar sensor, ancillary units and display, complete with its processing and presentation display. All of these component parts contribute to the requirements and approval to these radar standards. Other navigational systems and equipment that provide radar and/or target tracking functions, should comply with the relevant clauses of this standard according to the guidelines in Annex A. A navigation display or INS may be approved as part of a radar system when tested with the specific radar sensor and relevant ancillary units. Where the intended application for a navigation system is for collision avoidance, as a minimum requirement, the radar image should always be presented, together with the relevant functionality and performance as described in Annex A.

1.1 Purpose

(MSC.192/1) *The radar, when combined with other sensor, or reported information (for example AIS), should improve the safety of navigation by assisting in the efficient navigation of ships and protection of the environment by satisfying the following functional requirements:*

- *in coastal navigation and harbour approaches, by giving a clear indication of land and other fixed hazards;*

- as a means to provide an enhanced traffic image and improved situation awareness;
- in a ship-to-ship mode for aiding collision avoidance of both detected and reported hazards;
- in the detection of small floating and fixed hazards, for collision avoidance and the safety of own ship; and
- in the detection of floating and fixed aids to navigation.

1.2 Application of these standards

(MSC.192/2) *The Performance Standards defined by MSC.192(79) shall apply to all shipborne radar installations used in any configuration mandated by SOLAS independent of the type of ship, frequency band in use and the type of display, providing that no special requirements are specified in Table 1 and that additional requirements for specific classes of ship (in accordance with SOLAS Chapters V and X) are met.*

(MSC.192/2) *Close interaction between different navigation equipment and systems makes it essential to consider this standard in association with other relevant IMO and IEC standards.*

This standard applies to radar systems, navigation systems and navigation equipment which have the task of target detection and collision avoidance. Any equipment which combines these tasks and meets all of the requirements in this standard is regarded as a radar system. In support of the Collision Regulations, all available means shall be used to enhance the role of radar for safe navigation and collision avoidance. The usage of other sensors shall, where practical, observe the requirements of the standards associated with those sensors. This standard also provides guidelines and requirements for radar functionality on all navigational displays supporting the tasks of target detection, collision avoidance, general navigation and position referencing on the bridge of a ship.

The successful integration of radar with AIS, charts, databases and other sensors demands that the radar equipment is correctly set up with special attention to the critical alignment of heading(s), system index delay(s), CCRP offsets and gyro. Failure to align these parameters may cause unacceptable registration with other information and may detract from the purpose of integration. This standard has mandated requirements to provide for these alignments.

NOTE While X-band radar systems remain compatible with radar beacons, SARTs and radar enhancers, S-band systems are permitted to harness new radar technology which may not be compatible with those devices. All tests (or their equivalent) in this standard apply to both non-coherent (for example conventional-based radar) and coherent radar systems (for example pulse compression radar).

1.3 Equipment categories

This standard covers the testing of all SOLAS shipborne radar equipment. Individual equipment may be tested for a specific category of vessel. Table 1 provides a summary of the categories and basic differential capabilities for each category. The category should be indicated on the type label of the main radar electronics unit and on the related Certification of Test. Equipment approved for high speed applications should include a suffix H (for example CAT 1H) and equipment approved with a chart option should include a suffix C (for example CAT 1HC).

(MSC.192/5.3.1.1) *Recognising the high relative speeds possible between own ship and target, the equipment should be specified and approved as being suitable for classes of ship having normal (≤ 30 kn) or high (> 30 kn) own ship speeds (100 kn and 140 kn relative speeds respectively).*

The additional characteristics for equipment qualified to be approved for HSC and/or for chart radar are identified in this standard. For example, HSC equipment should be compatible with own ship speeds of up to 70 kn, should be capable of tracking targets with a 140 kn relative speed and should operate between latitudes of 70° N and 70° S.

A chart radar should conform to all the requirements of Clause 11 in this standard. References are made to IEC 61174 (ECDIS) for specific and standalone chart functionality.

Table 1 – Performance requirements for categories of ship/craft for SOLAS V

	Category of ship/craft		
	CAT 3	CAT 2	CAT 1
Size of ship/craft	<500 gt	500 gt to <10 000 gt and HSC<10 000 gt	All ships/craft ≥10 000 gt
Minimum operational display area diameter	180 mm	250 mm	320 mm
Minimum display area	195 mm x 195 mm	270 mm x 270 mm	340 mm x 340 mm
Auto acquisition of targets	-	-	Yes
Minimum <u>acquired</u> radar target capacity	20	30	40
Minimum <u>activated</u> AIS target capacity	20	30	40
Minimum <u>sleeping</u> AIS target capacity	100	150	200
Trial manoeuvre	-	-	Yes
NOTE The processing capacity of AIS information should be in accordance with 10.5.2.			

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 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*

IEC 61174, *Maritime navigation and radiocommunication equipment and systems – Electronic chart display and information systems (ECDIS) – Operational and performance requirements, methods of testing and required test results*

IEC 61966-4, *Multimedia systems and equipment – Colour measurement and management – Part 4: Equipment using liquid crystal display panels*

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

ISO 9000, *Quality management systems – Fundamentals and vocabulary*

ISO 9241-8, *Ergonomic requirements for office work with visual display terminals (VDTs) – Part 8: Requirements for displayed colours*

ISO 9241-12, *Ergonomic requirements for office work with visual display terminals (VDTs) – Part 12: Presentation of information*

ISO 13406-2, *Ergonomic requirements for work with visual displays based on flat panels – Part 2: Ergonomic requirements for flat panel displays*

ISO 80416-4, *Basic principles for graphical symbols for use on equipment – Part 4: Guidelines for the adaptation of graphical symbols for use on screens and displays (icons)*

ITU-R Recommendation M.628-4:2006, *Technical characteristics for search and rescue radar transponders*

ITU-R Recommendation M.824-3:2007, *Technical parameters of radar beacons (racons)*

ITU-R Recommendation M.1176:1995, *Technical parameters of radar target enhancers*

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

IHO S-52 Appendix 1:1996, *Guidance on updating the ENC*

IHO S-52 Appendix 2:2004, *Colour and symbol specifications for ECDIS*

IMO SOLAS:1974, *International Convention for the Safety of Life at Sea, as amended*

IMO Resolution 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 Resolution A.817(19):1995, *Performance standards for electronic chart display and information systems (ECDIS) (as amended by MSC.64(67) Annex 5 and MSC.86(70) Annex 4)*

IMO Resolution MSC.96(72), *Amendments to IMO Resolution A.824(19), Performance standards for devices to indicate speed and distance*

IMO Resolution MSC.112(73), *Revised performance standards for shipborne global positioning system (GPS) receiver equipment*

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

IMO Resolution MSC.192(72):2004, *Revised performance standards for radar equipment*

IMO SN/Circ.243:2004, *Guidelines for the presentation of navigation related symbols, terms and abbreviations*

CIE 15:2004, *Colorimetry*

VESA-2001-6:2001, *Flat Panel Display Measurements (FPDM)*