

© Copyright SEK Svensk Elstandard. Reproduction in any form without permission is prohibited.

Marin navigerings- och kommunikationsutrustning – System för automatisk identifiering (AIS) – Flygburen SAR-utrustning – Tekniska och operationella fordringar, provningsmetoder och erforderliga provningsresultat

Maritime navigation and radio communication equipment and systems –

Automatic identification systems (AIS) –

SAR airborne equipment –

Operational and performance requirements, methods of test and required test results

Som svensk standard gäller europastandarden EN IEC 63135:2019. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 63135:2019.

Nationellt förord

Europastandarden EN IEC 63135:2019

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 63135, First edition, 2018 - Maritime navigation and radio communication equipment and systems - Automatic identification systems (AIS) - SAR airborne equipment - Operational and performance requirements, methods of test and required test results**

utarbetad inom International Electrotechnical Commission, IEC.

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

Genom att utforma sådana standarder blir säkerhetsfordringar tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard

Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

English Version

Maritime navigation and radiocommunication equipment and
systems - Automatic identification systems (AIS) - SAR Airborne
equipment - Operational and performance requirements,
methods of test and required test results
(IEC 63135:2018)

Matériels et systèmes de navigation et de
radiocommunication maritimes - Systèmes d'identification
automatique (AIS) - Equipement aéroporté SAR -
Exigences d'exploitation et de fonctionnement, méthodes
d'essai et résultats d'essai exigés
(IEC 63135:2018)

Navigations- und Funkkommunikationsgeräte und -systeme
für die Seeschifffahrt - Automatische Identifikationssysteme
(AIS) - Ausrüstung für Such- und Rettungs-Fluggeräte -
Betriebs- und Leistungsanforderungen, Prüfverfahren und
geforderte Prüfergebnisse
(IEC 63135:2018)

This European Standard was approved by CENELEC on 2018-12-28. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 80/875/CDV, future edition 1 of IEC 63135, prepared by IEC/TC 80 "Maritime navigation and radiocommunication equipment and systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 63135:2019.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2019-09-28
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-12-28

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 63135:2018 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61097-14	NOTE	Harmonized as EN 61097-14
IEC 61108-1	NOTE	Harmonized as EN 61108-1
IEC 61108-2	NOTE	Harmonized as EN 61108-2
IEC 61108-3	NOTE	Harmonized as EN 61108-3
IEC 61162-2	NOTE	Harmonized as EN 61162-2
IEC 61162-3	NOTE	Harmonized as EN 61162-3
IEC 61162-450	NOTE	Harmonized as EN IEC 61162-450
IEC 61162-460	NOTE	Harmonized as EN IEC 61162-460
IEC 61993-2	NOTE	Harmonized as EN IEC 61993-2
IEC 62287-1	NOTE	Harmonized as EN 62287-1
IEC 62287-2	NOTE	Harmonized as EN 62287-2
IEC 62320-1	NOTE	Harmonized as EN 62320-1
IEC 62320-2	NOTE	Harmonized as EN 62320-2
ISO 9000	NOTE	Harmonized as EN ISO 9000

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61162-1	-	Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners	-	-
ITU-R Recommendation M.1371-5	2014	Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band	-	-
ITU-T Recommendation O.153	-	Basic parameters for the measurement of error performance at bit rates below the primary rate	-	-

CONTENTS

FOREWORD.....	7
1 Scope	9
2 Normative references	9
3 Terms, definitions, symbols and abbreviated terms.....	9
3.1 Terms and definitions.....	9
3.2 Symbols and abbreviated terms	10
4 General requirements	11
4.1 General.....	11
4.1.1 Overview	11
4.1.2 Capabilities of the AIS	11
4.1.3 Transmitter shutdown procedure.....	11
4.2 Modes of operation	11
5 Performance requirements.....	11
5.1 Composition.....	11
5.2 Time and position	12
5.2.1 Source for UTC.....	12
5.2.2 Source for AIS position reporting	12
5.3 User interface	12
5.4 Identification	12
5.5 Information	13
5.5.1 Information provided by the AIS SAR airborne station.....	13
5.5.2 Information reporting intervals	13
5.5.3 AIS station reporting capacity	14
5.6 Permissible initialization period.....	14
5.7 Technical characteristics.....	14
5.8 Alarms and indications, fall-back arrangements	14
5.8.1 Built-in test equipment.....	14
5.8.2 Alarm messages	14
5.8.3 Status messages	16
6 Technical requirements	18
6.1 General.....	18
6.2 Physical layer	19
6.2.1 General	19
6.2.2 Transmitter parameters.....	19
6.2.3 Receiver parameters	21
6.3 Link layer	21
6.3.1 General	21
6.3.2 Link sublayer 1: medium access control (MAC).....	22
6.3.3 Link sublayer 2: data link service (DLS)	22
6.3.4 Link sublayer 3: link management entity (LME)	22
6.4 Network layer.....	24
6.4.1 General	25
6.4.2 Setting of operating channels	25
6.5 Transport layer	25
6.6 Presentation interface.....	25
6.6.1 General	25

6.6.2	Optional automatic input of sensor data	26
6.6.3	High speed input/output ports	27
7	Test conditions	29
7.1	Normal and extreme test conditions	29
7.1.1	Normal test conditions	29
7.1.2	Extreme test conditions	29
7.2	Standard test environment	30
7.3	Additional test arrangements.....	30
7.3.1	Arrangements for test signals applied to the receiver input	30
7.3.2	Encoder for receiver measurements	30
7.3.3	Waiver for receivers.....	30
7.3.4	Impedance.....	30
7.3.5	Artificial antenna (dummy load)	31
7.3.6	Facilities for access	31
7.3.7	Modes of operation of the transmitter.....	31
7.4	Common test conditions for protection from invalid controls	31
7.5	Measurement uncertainties	31
8	Test signals	32
8.1	Standard test signal number 1	32
8.2	Standard test signal number 2 (TDMA)	32
8.3	Standard test signal number 3 (TDMA)	32
8.4	Standard test signal number 4 (PRBS).....	32
8.5	Standard test signal number 5 (PRBS).....	32
9	Power supply, special purpose and safety tests	33
10	Environmental tests	33
11	Operational tests	33
11.1	Identification and operating modes.....	33
11.1.1	Autonomous mode	34
11.1.2	Polled mode	34
11.1.3	Addressed operation.....	35
11.1.4	Transmission retry	35
11.1.5	Broadcast operation.....	36
11.1.6	Multiple slot messages	37
11.2	Information	37
11.2.1	Information provided by the AIS.....	38
11.3	Initialization period.....	38
11.3.1	Method of measurement	38
11.3.2	Required results	38
11.4	Transceiver protection	38
11.4.1	Method of measurement	38
11.4.2	Required results	38
11.5	Alarms and indicators, fall-back arrangements	38
11.5.1	Monitoring of functions and integrity	38
11.5.2	Monitoring of sensor data	39
12	Physical tests	41
12.1	TDMA transmitter.....	41
12.1.1	Frequency error	41
12.1.2	Carrier power.....	42

12.1.3	Slotted transmission spectrum	42
12.1.4	Modulation accuracy	43
12.1.5	Transmitter output power characteristics	44
12.2	TDMA receivers	44
12.2.1	Sensitivity	44
12.2.2	Error behaviour at high input levels	45
12.2.3	Co-channel rejection	46
12.2.4	Adjacent channel selectivity	46
12.2.5	Spurious response rejection	47
12.2.6	Intermodulation response rejection and blocking	49
12.2.7	Blocking or desensitisation	50
12.2.8	Transmit to receive switching time	51
12.2.9	Immunity to out-of-band energy	52
12.3	Conducted spurious emissions	52
12.3.1	Spurious emissions from the transmitter	52
12.3.2	Spurious emissions from the receiver	53
13	Specific tests of Link layer	53
13.1	TDMA synchronisation	54
13.1.1	Synchronisation test using UTC	54
13.1.2	Synchronisation test using UTC with repeated messages	54
13.1.3	Synchronisation test without UTC, semaphore	55
13.1.4	Synchronisation test without UTC	55
13.1.5	Reception of un-synchronised messages	55
13.2	Synchronisation and jitter accuracy	55
13.2.1	Definition	55
13.2.2	Method of measurement	56
13.2.3	Required results	56
13.3	Data encoding (bit stuffing)	56
13.3.1	Method of measurement	56
13.3.2	Required results	56
13.4	Frame check sequence	56
13.4.1	Method of measurement	56
13.4.2	Required results	56
13.5	Slot allocation (channel access protocols)	56
13.5.1	Network entry	56
13.5.2	Autonomous scheduled transmissions (SOTDMA)	57
13.5.3	Scheduling of other reporting intervals	57
13.5.4	Safety related/binary message transmission	58
13.5.5	Transmission of static data with Message 24A (ITDMA)	58
13.5.6	Transmission of static data with Message 5 (ITDMA)	59
13.5.7	Assigned operation	59
13.5.8	Group assignment	61
13.5.9	Fixed allocated transmissions (FATDMA)	64
13.5.10	Randomisation of message transmissions	65
13.6	Message formats	65
13.6.1	Received messages	65
13.6.2	Transmitted messages	65
14	Specific tests of Network layer	66
14.1	Dual channel operation – Alternate transmissions	66

14.1.1	Method of measurement	66
14.1.2	Required results	66
14.2	Regional area designation by serial sentence	66
14.2.1	Method of measurement	66
14.2.2	Required results	66
14.3	Slot reuse	66
14.3.1	Method of measurement	66
14.3.2	Required results	67
15	Specific tests of Transport layer	67
15.1	Behaviour of NavStatus 14 reception	67
15.1.1	Test of AIS SART message	67
15.1.2	Test of MOB-AIS message.....	68
15.1.3	Test of EPIRB-AIS message.....	68
16	Specific presentation interface tests	68
16.1	General.....	68
16.2	Checking manufacturer's documentation	68
16.3	Test of sensor input	69
16.3.1	Test of GNS input	69
16.3.2	Test of RMC input.....	69
16.3.3	Test of DTM input	70
16.3.4	Test of GBS input	70
16.3.5	Test of VTG input	71
16.4	Test of high speed output.....	71
16.4.1	Method of measurement	71
16.4.2	Required results	71
16.5	High speed output interface performance.....	71
16.5.1	Method of measurement	71
16.5.2	Required results	71
16.6	Test of high speed input.....	72
16.6.1	General	72
16.6.2	Test of VSD input sentence	72
16.6.3	Test of SSD input sentence	72
16.6.4	Test of EPV input sentence	73
Annex A (informative)	Block diagram of AIS SAR airborne station.....	74
Bibliography.....		75
Figure 1	– OSI layer model	19
Figure 2	– Power versus time characteristics	20
Figure 3	– Format for repeating four-packet cluster.....	32
Figure 4	– Measurement arrangement for frequency error.....	41
Figure 5	– Measurement arrangement for carrier power	42
Figure 6	– Emission mask for slotted transmission.....	43
Figure 7	– Measurement arrangement for modulation accuracy	43
Figure 8	– Measurement arrangement	45
Figure 9	– Measurement arrangement with two generators	46
Figure 10	– SINAD or PER/BER measuring equipment	48
Figure 11	– Measurement arrangement for intermodulation.....	50

Figure 12 – Measurement arrangement for blocking or desensitisation	50
Figure 13 – Transmit to receive switching time measurement setup	51
Figure A.1 – Block diagram of AIS SAR airborne station	74
Table 1 – Integrity alarm conditions signalled using ALR sentence formatter	15
Table 2 – Sensor status indications signalled using TXT sentence formatter	16
Table 3 – Position sensor fall-back conditions.....	17
Table 4 – Use of position accuracy (PA) flag.....	18
Table 5 – Transmitter parameters	20
Table 6 – Power versus time characteristics	21
Table 7 – Receiver parameters	21
Table 8 – Use of VDL messages	23
Table 9 – Presentation interface access.....	26
Table 10 – IEC 61162-1 sensor sentences.....	26
Table 11 – AIS high-speed input data and formats	27
Table 12 – AIS high-speed output data and formats	28
Table 13 – Property identifiers	29
Table 14 – Content of first two packets	33
Table 15 – Fixed PRS data derived from Recommendation ITU-T O.153.....	33
Table 16 – Peak frequency deviation versus time.....	44
Table 17 – Frequencies for inter-modulation test	50

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT
AND SYSTEMS – AUTOMATIC IDENTIFICATION SYSTEMS (AIS) – SAR
AIRBORNE EQUIPMENT – OPERATIONAL AND PERFORMANCE
REQUIREMENTS, METHODS OF TEST 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.
- 2) The formal decisions or agreements of 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 IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 63135 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

The text of this International Standard is based on the following documents:

CDV	Report on voting
80/875/CDV	80/889/RVC

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

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document 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 – AUTOMATIC IDENTIFICATION SYSTEMS (AIS) – SAR AIRBORNE EQUIPMENT – OPERATIONAL AND PERFORMANCE REQUIREMENTS, METHODS OF TEST AND REQUIRED TEST RESULTS

1 Scope

This document specifies the minimum operational and performance requirements, methods of testing and required test results as applicable for automatic identification systems (AIS) VHF data link (VDL) related parts of an AIS SAR airborne station. This document incorporates the applicable technical characteristics of AIS SAR airborne equipment included in Recommendation ITU-R M.1371 and takes into account the ITU Radio Regulations, where applicable.

This document also specifies the minimum requirements for the interfaces to other equipment suitable to be used as means of input and display data.

Attention is drawn on that other requirements specific for airborne equipment can exist and are beyond the scope of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 61162-1, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners*

ITU-R Recommendation M.1371-5:2014, *Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile frequency band*

ITU-T Recommendation O.153, *Basic parameters for the measurement of error performance at bit rates below the primary rate*