INTERNATIONAL STANDARD

IEC 61993-2

First edition
2001-12

**Maritime navigation and radiocommunication equipment and systems –
Automatic identification systems (AIS) –**

**Part 2:
Class A shipborne equipment of the universal automatic identification system (AIS) –
Operational and performance requirements, methods of test and required test results**

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MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – AUTOMATIC IDENTIFICATION SYSTEMS (AIS)

Part 2: Class A shipborne equipment of the universal automatic identification system (AIS) – Operational and performance requirements, methods of test and required test results

FOREWORD

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International Standard IEC 61993-2 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
80/315/FDIS	80/328/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.

The committee has decided that the contents of this publication will remain unchanged until 2006-07. At this date, the publication will be

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- withdrawn;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

INTRODUCTION

Following the adoption by the International Maritime Organisation (IMO) of Resolution MSC.74(69) Annex 3, Performance Standard for a Universal Shipborne Automatic Identification System, TC 80 established Working Group 8A to develop IEC 61993-2. Technical requirements were provided in ITU-R M.1371 "Technical characteristics for a universal shipborne Automatic Identification System (AIS) using TDMA (Self-Organising Time Division Multiple Access) in the VHF maritime mobile band". Carriage requirements for SOLAS ships have been adopted by IMO for entry into force starting on July 1st 2002.

It was brought to the attention of WG8A that patents and patents pending pertaining to AIS have been made freely available. TC 80 WG8A considers the technical implementation specified by this International Standard to be in full accordance with the requirements of Recommendation ITU-R M.1371-1 and as such to be free from claims of intellectual property rights.

The provision of a high-speed network connection IEC 61162-3 is optional. It may become a requirement in a later revision of this standard, when the relevant standard (IEC 61162-3) has been adopted.

The IMO Resolution MSC.74(69) Annex 3, Performance Standard for an Universal Shipborne Automatic Identification System, requires that the AIS has a means of processing data from an electronic position fixing system that provides a resolution of one ten-thousandth of a minute of arc and uses the WGS 84 datum. Resolution A.815(19) requires an accuracy of position information better than 10 m in confined waters. This does not require but implies that if the ship is not equipped with a DGNSS, the GNSS sensor internal to the AIS should be a DGNSS and should be used as source of position information.

Moreover, Resolution MSC.74(69) Annex 3 does not include any requirement for backup arrangements of the position information. However, a GNSS sensor is included in the AIS equipment as the source of UTC. It is felt by IEC TC 80 that this GNSS sensor also can be used as a back-up arrangement for the position information obtained from the ships DGNSS. This would ensure the availability of the AIS system in case of failure of the ship's EPFS.

Therefore, IEC TC 80 strongly recommends that manufacturers of AIS equipment implement such an arrangement in accordance with table 4 of this International Standard.

Note that an IEC standard detailing class B AIS is being prepared as IEC 62287.

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – AUTOMATIC IDENTIFICATION SYSTEMS (AIS)

Part 2: Class A shipborne equipment of the universal automatic identification system (AIS) – Operational and performance requirements, methods of test 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 adopted by the IMO in resolution MSC.74(69), Annex 3, Universal Shipborne Automatic Identification System. This standard incorporates the technical characteristics of Class A shipborne equipment included in Recommendation ITU-R M1371-1 and takes into account the ITU Radio Regulations where applicable. In addition it takes account of IMO resolution A.694(17) to which IEC 60945 is associated.

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

NOTE All text of this standard, that is identical to that in IMO resolution MSC.74(69), Annex 3 and IMO resolution A.694(17) or to that in ITU-R M.1371-1 is printed in *italics* and the resolution (abbreviated to – A3 or – A694 respectively) or the recommendation (abbreviated to – M.1371-1) and paragraph numbers are indicated in parentheses i.e. (A3/3.3) or (M.1371-1/3.3) respectively.

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 61108-1, *Maritime navigation and radiocommunication equipment and systems – Global navigation satellite systems (GNSS) – Part 1: Global positioning system (GPS) – Receiver equipment – Performance standards, methods of testing and required test results.*

IEC 61108-2, *Maritime navigation and radiocommunication equipment and systems – Global navigation satellite systems (GNSS) – Part 2: Global navigation satellite system (GLONASS) – Receiver equipment – Performance standards, methods of testing and required test results*

IEC 61108-4[1], *Maritime navigation and radiocommunication equipment and systems – Global navigation satellite systems (GNSS) – Part 4: Shipborne DGPS and DGLONASS maritime radio beacon receiver equipment*

IEC 61162-1, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners*

[1] To be printed.

IEC 61162-2, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 2: Single talker and multiple listeners, high-speed transmission*

IEC 61162-3[2]: *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 3: Multiple Talker and multiple listeners – High speed network bus*

IEC 61993-1, *Maritime navigation and radiocommunication equipment and systems – Part 1: Shipborne automatic transponder system installation using VHF digital selective calling (DSC) techniques – Operational and performance requirements, methods of testing and required test results*

ISO/IEC 3309, *Information technology – Telecommunications and information exchange between systems – High-level data link control (HDLC) procedures – Frame structure*

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.815(19):1995, *Worldwide radionavigation system*

IMO Resolution A.851(20):1997, *General principles for ship reporting systems and ship reporting requirements, including guidelines for reporting incidents involving dangerous goods, harmful substances and/or marine pollutants*

IMO Resolution MSC.43(64), as amended by MSC.111(73), *Guidelines and Criteria for Ship Reporting Systems.*

IMO Resolution MSC.74(69), *Annex 3, Recommendation on performance standards for AIS*

IMO Guidelines on the operational use of AIS (provisional)

ITU-R Recommendation M.489-2, *Technical characteristics of VHF radiotelephone equipment operating in the maritime mobile service in channels spaced by 25 kHz*

ITU-R Recommendation M.825-3, *Characteristics of a transponder system using digital selective calling techniques for use with vessel traffic services and ship-to-ship identification*

ITU-R Recommendation M.1084-4, *Interim solutions for improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service*

NOTE ITU-R M.1371-1 references ITU-R M.1084-3, Annex 3. A Draft Revision of Recommendation ITU-R M.1084-3, consequentially leading to ITU-R M.1084-4, has been approved in parallel to the approval of ITU-R M.1371-1.

ITU-R Recommendation M.1371-1, *Technical characteristics for a universal shipborne automatic identification system using time division multiple access in the VHF maritime mobile band*

IALA Technical clarifications to recommendation ITU-R M.1371-1

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[2] To be printed.

3 Abbreviations

AIS	universal shipborne automatic identification system
BIIT	built-in integrity tests
COG	course over ground
ECDIS	electronic chart display and information system
EPFS	electronic position-fixing systems
ETA	estimated time of arrival
EUT	equipment under test
GBS	see IEC 61162-1, table 5
GGA	see IEC 61162-1, table 5
GLL	see IEC 61162-1, table 5
HDG	heading
HDTWPL	see IEC 61162-1, table 5
HSC	high speed craft
IHO	International Hydrographic Office
IMO	International Maritime Organization
LR	long range
MAC	medium access control
MKD	minimum keyboard and display
MMSI	maritime mobile service identity
NUC	not under command
OSD	see IEC 61162-1, table 5
PER	packet error rate
PI	presentation interface
RAIM	receiver autonomous integrity monitoring
RMC	see IEC 61162-1, table 5
SOG	speed over ground
UTC	universal time co-ordinated
VBW	see IEC 61162-1, table 5
VDL	VHF data link
VDM	serial output message containing VDL information (IEC 61162-1)
VSWR	voltage standing wave ratio
VTG	see IEC 61162-1, table 5
Rx	receive
Tx	transmit
msg	message

NOTE Abbreviations related to IEC 61162 series are not included in the above list. For their meaning, refer to that International Standard.

4 General requirements

Requirements contained in this clause 4 are requirements not taken up in other clauses and which cannot be verified by repeatable methods of measurement. These requirements include the applicable general and operational requirements of IEC 60945, as detailed in clause 6 (Operational checks), clause 13 (Maintenance), clause 14 (Equipment manuals) and clause 15 (Marking and Identification) of that International Standard.

The manufacturer shall declare compliance with these requirements and shall provide relevant documentation. The declarations, documentation and where necessary, the EUT shall be checked or verified by inspection.

The manufacturer shall also declare the composition of the EUT and the category for durability and resistance to environmental conditions for each unit of the EUT as specified in IEC 60945.

4.1 General

(A3/1)

4.1.1 General requirements

4.1.1.1 (A3/1.1) *This* standard *specifies the requirements for the universal AIS.*

4.1.1.2 (A3/1.2) *The AIS* shall *improve the safety of navigation by assisting in the efficient navigation of ships, protection of the environment, and operation of Vessel Traffic Services (VTS), by satisfying the following functional requirements:*

– *in a ship-to-ship mode for collision avoidance;*

– *as a means for littoral States to obtain information about a ship and its cargo; and*

– *as a VTS tool, i.e. ship-to-shore (traffic management).*

4.1.2 Capabilities of the AIS

(A3/1.3) *The AIS* shall *be capable of providing to ships and to competent authorities, information from the ship, automatically and with the required accuracy and frequency, to facilitate accurate tracking. Transmission of the data* shall *be with the minimum involvement of ship's personnel and with a high level of availability.*

4.1.3 Additional requirements

(A3/1.4) *The installation, in addition to meeting the requirements of the Radio Regulations, applicable ITU-R Recommendations and the general requirements as set out in resolution A.694 (17),* shall *comply with the following performance standards, as contained in the following clauses*.

4.1.4 Transmitter shutdown procedure

(M.1371-1/A2-2.14)

(M.1371-1 A2/2.14.1) *An automatic transmitter hardware shutdown procedure and indication* shall *be provided in case a transmitter does not discontinue its transmission within 1,0 s of the end of its transmission slot*.

4.1.5 Quality assurance

The Administration shall require[3] that the manufacturers have a quality control system[4] audited by a competent authority to ensure continuous compliance with the type approval conditions. Alternatively, the Administration may use final product verification procedures where a competent authority verifies compliance with the type approval certificate before the product is installed on board ships.

4.2 Modes of operation

(A3/2)

4.2.1 General

(A3/2.1) *The system* shall *be capable of operating in a number of modes:*

4.2.1.1 *an "autonomous and continuous" mode for operation in all areas. This mode* shall *be capable of being switched to/from one of the following alternate modes by a competent authority;*

Autonomous and continuous operation shall be as described in 3.3.5 of Annex 2 of Recommendation ITU-R M.1371-1;

4.2.1.2 *an "assigned" mode for operation in an area subject to a competent authority responsible for traffic monitoring such that the data transmission interval and/or time slots may be set remotely by that authority;*

Assigned operation shall be as described in 3.3.6 of Annex 2 of Recommendation ITU-R M.1371-1;

4.2.1.3 *a "polling" or controlled mode where the data transfer occurs in response to interrogation from a ship or competent authority.*

Polling operation shall be as described in 3.3.2 of Annex 2 of ITU-R M.1371-1 and in Annex 1 of Recommendation ITU-R M.825-3 – for DSC compatibility.

4.2.2 Criteria for reporting

(A3/6.3) *To protect the unauthorised dissemination of data, the IMO guidelines (Guidelines and Criteria for Ship Reporting Systems* Resolution MSC.43(64)) shall *be followed.*

4.3 Manuals

In addition to the requirements of IEC 60945 clause 14, the manuals shall include:

– the type of external connector required for connection of the external display as referred to in 7.6.3.2;
– the needed information for correct siting of the antennas; and
– the requirements for external illumination, as appropriate.

4.4 Marking and identification

In addition to the requirements of IEC 60945, clause 15, the markings shall include:

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[3] See SOLAS 1974 as amended Ch. V 18.5

[4] ISO 9000 series, as applicable, meets this requirement.

a) details of the power supply from which the equipment is intended to be operated; and if applicable,

b) the date by which batteries need to be replaced.

5 Environmental, power supply, special purpose and safety requirements

The AIS shall be tested for compliance with the environmental, power supply, special-purpose and safety requirements of IMO A.694(17) as detailed in IEC 60945. The required tests, for which a repeatable method of measurement has been defined, are given in clauses 11, 12 and 13 of this standard. The declaration of category to IEC 60945 required in clause 4, shall define the relevant tests to be applied as follows:

– AIS equipment declared for protected installation shall meet the requirements described in table 3 column "protected" of IEC 60945.

– Exposed AIS equipment shall meet the requirements described in table 3, column "exposed" of IEC 60945.

– Portable AIS equipment shall meet the requirements of table 3 of IEC 60945 "protected" or "exposed" as appropriate.

6 Performance requirements

6.1 Composition

(A3/3)

6.1.1 (A3/3.1) *The AIS* shall *comprise*:

6.1.1.1 *a communication processor, capable of operating over a range of maritime frequencies, with an appropriate channel selecting and switching method, in support of both short (VHF) and long (beyond VHF) range applications.* For long range applications the AIS shall provide a two-way interface which complies with IEC 61162*;*

6.1.1.2 at least one transmitter, two TDMA receivers and one dedicated DSC receiver tuned to channel 70;

6.1.1.3 *a means of processing data from an electronic position-fixing system which provides a resolution of one ten thousandth of a minute of arc and uses the WGS 84 datum.*

An interface (IEC 61162) shall be provided to input the position used for navigation. Position information, if available from other EPFS, shall be used only as a back up and the user shall be informed of this (see 6.10).

6.1.1.4 *a means to automatically input data from other sensors meeting the provisions as specified in paragraph* 6.5.1.2; A means, external to the AIS, to comply with this requirement shall be tested to the applicable requirements of IEC 60945.

6.1.1.5 *a means to input and retrieve data manually.* The possibility of manual input and retrieval as described in 6.11 shall be demonstrated based on the manufacturer's documentation

6.1.1.6 *a means of error checking the transmitted and received data* (see 7)*; and*

6.1.1.7 *built-in test equipment* as specified in 6.10.1.