Guideline No. N-14 (202511)

N-14

CLASS B SHIPBORNE AUTOMATIC IDENTIFICATION SYSTEM

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Foreword

China Classification Society (hereinafter referred to as CCS) Product Inspection and Testing Guideline (hereinafter referred to as this Guideline) contains the technical requirements, inspection and testing criteria related to classification and statutory survey of marine products to be applied for CCS approval/inspection.

This Guideline frees the users to adopt other test methods and requirements which are equivalent to or are stricter than this Guideline.

This Guideline is published and updated by CCS, and is released at http://www.ccs.org.cn. Your comments or suggestions are welcomed and may be sent to our email addressed service@ccs.org.cn.

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CLASS B SHIPBORNE AUTOMATIC IDENTIFICATION SYSTEM

1 Application

1.1 The Guidelines, serving as a supplement to and refinement of the "Implementation Guidelines for Ship Technical Regulations (No. 2, 2025)" issued by the Maritime Safety Administration of the Ministry of Transport, is applicable solely to the type approval and unit/batch product survey of Class B Shipborne Automatic Identification System.

1.2 The Guidelines applies only to Class B Shipborne Automatic Identification System that employs CSTDMA technology and is installed on board ships after October 1, 2025.

2 Normative References

2.1.1 Maritime Safety Administration of the Ministry of Transport, *Technical Regulations for Statutory Surveys of Sea-going Ships Engaged on Domestic Voyages* (2020) and its amendment bulletins, Chapter 5, Part 4 (hereinafter referred to as the "Technical Regulations");

2.1.2 Maritime Safety Administration of the Ministry of Transport, *Technical Regulations for Statutory Survey of Inland Waterway Ships* (2019) and its amendment bulletins, Chapter 6, Part 5;

2.1.3 Maritime Safety Administration of the Ministry of Transport, *Rules for Inspection of Marine Products* (2024);

2.1.4 Maritime Safety Administration of the Ministry of Transport, *Implementation Guidelines for Ship Technical Regulations* (No. 2, 2025), *Implementation Guidelines for the Survey of Class B Shipborne Equipment of the Automatic Identification System (AIS)* (hereinafter referred to as the "Implementation Guidelines");

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

2.1.6 IEC 62287-1:2017+AMD1:2022 CSV: Maritime navigation and radiocommunication equipment and systems - Class B shipborne equipment of the automatic identification system (AIS) - Part 1: Carrier-sense time division multiple access (CSTDMA) techniques;

2.1.7 IEC 61162 (all parts): Maritime navigation and radiocommunication equipment and systems – Digital interfaces;

2.1.8 IEC 62288:2021: Maritime navigation and radiocommunication equipment and systems -

Presentation of navigation-related information on shipborne navigational displays - General requirements, methods of testing and required test results;

2.1.9 IEC 60945:2002/COR1:2008: Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results;

2.1.10 GB/T 20068-2017: Technical requirements of shipborne automatic identification system (AIS);

2.1.11 GD019-2024 CCS Guidelines for Type Approval Test of Electrical and Electronic Products;

2.2 When the above regulations, performance proposals and test standards are changed, the latest valid version of documents shall be used.

3 Terms and Definitions

The terms and definitions defined in the above accreditation and survey bases are applicable to the Guidelines. For the purpose of compilation and ease of use, the Guidelines directly cite or supplement the following definitions.

3.1 AIS（Automatic Identification System）：自动识别系统；

3.2 BER（Bit Error Rate）：比特误码率；

3.3 BIIT（Built-in Integrity Tests）：内置式完整性测试；

3.4 BDS (Bei Dou Navigation Satellite System) ：北斗卫星导航系统；

3.5 COG(Course Over Ground)：对地航向；

3.6 SOG(Speed Over Ground)：对地航速；

3.7 UTC (Universal Time Coordinated)：世界协调时；

3.8 MKD（Minimum Keyboard and Display）：最小键盘和显示；

3.9 MMSI（Maritime Mobile Service Identity）：海上移动业务识别码；

3.10 RX（Receiver）：接收机；

3.11 TX（Transmitter）：发信机；

3.12 VDL（VHF Data Link）：VHF 数据链路；

3.13 GNSS（Global Navigation Satellite Systems）：全球卫星导航系统；

3.14 EUT（Equipment Under Test）：被试设备；

3.15 CSTDMA（Carrier-sense Time Division Multiple Access）：载波侦听时分多址；

3.16 RAIM（receiver autonomous integrity monitoring）：接收机自动完好性监测；

3.17 CGCS2000 (China Geodetic Coordinate System 2000): This is a geocentric geodetic coordinate system established through the joint adjustment of the Chinese GPS continuous operation reference station network, the space geodetic control network, and the astro-geodetic network with the space network. CGCS2000 is based on the ITRF97 reference frame, with a reference epoch of 2000.0.

3.18 VTS: Vessel Traffic Service.

4 Drawings and Documents

4.1 General Principles

4.1.1 The scope and level of detail of the drawings and technical documentation submitted shall be sufficient to verify the equipment's compliance with the Guidelines and the relevant standards, and to allow for a general review of the product's mechanical and electrical design.

4.1.2 The documents submitted shall be identified in accordance with the manufacturer's quality management system and shall facilitate easy reference to the relevant technical requirements.

4.2 The following drawings and documentation shall be submitted to CCS for review

4.2.1 Overall outline drawing and construction drawing;

4.2.2 Electrical schematic diagram, wiring diagram, and electrical functional block diagram;

4.2.3 System wiring diagram;

4.2.4 Product technical specifications;

4.2.5 Product operation manual;

4.2.6 Type test program and delivery test program;

4.3 The scope and level of detail of the drawings and technical documentation submitted shall be sufficient to review and verify the product's compliance with the specified and relevant standards, and to allow for the inspection and testing of the product's appearance, construction, and electrical design.

4.4 The documents submitted shall be managed and identified in accordance with the manufacturer's quality management system. Technical documents shall facilitate checking against the relevant technical requirements.

5 Technical Requirements

5.1 The electrical safety, power supply condition adaptability, environmental suitability, and electromagnetic compatibility of the equipment shall be suitable for the shipboard operating environment and shall satisfy the test requirements for "sheltered equipment" or "exposed equipment" as stipulated in IEC 60945.

5.2 Functional and performance requirements

5.2.1 General requirements

(1) Functionality

① It shall enhance the safety of voyage by assisting the ship's navigation and the operation of VTS.

② It shall be capable of providing automatically and continuously information from the ship with the required accuracy and update rate. Its primary purposes are:

(a) To assist in collision avoidance;

(b) As a means for littoral States to obtain information about the ship;

(c) As a tool for Vessel Traffic Services (VTS), i.e., ship-to-shore (traffic management).

③ It shall be interoperable and compatible with Class A shipborne mobile AIS equipment, other Class B shipborne mobile AIS equipment, or any other AIS equipment operating on the AIS VDL. It shall receive information from other stations, and its information shall be receivable by other stations, without impairing the integrity of the overall AIS VDL.

④ The equipment shall transmit only when it has established that the time slot to be used for transmission will not interfere with transmissions from equipment meeting the requirements of ITU-R M.1371-5 and from base stations.

(2) Operational security

It shall have functions to prevent unauthorized personnel from performing operations such as addition, modification, or deletion of software within the equipment. The manufacturer shall provide means for software updates.

Data used during operation and stored within the system shall be protected to ensure that necessary modifications and revisions made by the user do not compromise its integrity and correctness.

(3) Operational modes

In accordance with the requirements of the competent authority, the system transmitting messages may operate in the following operational modes. The system shall not retransmit received information.

① Autonomous mode

An "autonomous and continuous" mode for operation in all areas transmitting Message 18 for scheduled position reporting and Message 24 for static data.
The Class B "CS" AIS shall be able to receive and process messages at any time except during time periods of transmission.

② Assigned mode

An "assigned" mode for operation in an area subject to a competent authority responsible for traffic monitoring so that the reporting interval, silent mode and/or transceiver behaviour may be set remotely by that authority using group assignment by Message 23.

③ Interrogation mode

The polling mode is the mode for "Polling" and "Control". In polling mode, it responds to interrogations via Message 18 and Message 24 from a Class A AIS, SAR aircraft, or base station. Interrogations shall not consider silent periods set by Message 23. It shall not interrogate other stations.

(4) marking and identification

Each unit of the equipment shall be marked externally with the following information which, where practicable, shall be clearly visible when the equipment is installed in its recommended position:

① identification of the manufacturer;

② equipment type number or model identification;

③ serial number of the unit;

④ Power supply requirements;

⑤ Compass safe distance.

Alternatively, the marking may be presented on a display at equipment start-up.The version of software shall be either marked or displayed on command on the equipment.When the marking and the title and version of the software are presented only on the display, such information shall also be included in the equipment manual.

The equipment shall broadcast the Manufacturer ID, equipment model, and equipment serial number as defined in Message 24B and Table 76A of GB/T 20068. The aforementioned information shall be permanently written once by the manufacturer and shall be marked on the equipment nameplate.

5.2.2 Performance requirements

(1) composition

The B "CS" AIS shall comprise the following.

① A communication processor, capable of operating in a part of the VHF maritime mobile service band, in support of short range (VHF) applications.

② At least one TDMA transmitter and two TDMA receivers. The two TDMA receivers shall operate independently and simultaneously on AIS Channel A and Channel B.

③ A built-in GNSS position sensor providing a resolution of one ten-thousandth of a minute of arc and using the CGCS2000 datum. The internal GNSS position sensor may provide

an optional internal UTC synchronization source.

(2) Operating frequency channels

It shall operate within the frequency range 161.500 MHz to 162.025 MHz with a 25 kHz bandwidth as per ITU-R RR:2024 Appendix 18, and shall comply with the provisions of ITU-R M.1084-5:2012 Appendix 4.
Upon receiving a command to change to a channel outside its operating range or bandwidth, the "CS" Class B AIS shall automatically revert to a receive-only mode on AIS Channel 1 and AIS Channel 2.

(3) GNSS receiver for position reporting

It shall be equipped with a built-in GNSS position sensor serving as the sole source for position, COG, and SOG information, except for test purposes. The built-in GNSS position sensor shall meet the requirements specified in Appendix 5, Chapter 5, Part 4 of the Technical Regulations for Statutory Surveys of Sea-going Ships Engaged on Domestic Voyages regarding the following items:

① Reception of data messages, indicating the use of the CGCS2000 datum;

② COG and SOG accuracy;

③ Availability of internal position;

④ Electromagnetic compatibility;

⑤ Status indication (RAIM is optional);

The internal GNSS receiver shall be capable of receiving differential correction data, e.g., via Message 17.

An input port for an external GNSS receiver may be provided. Data from an external GNSS receiver shall be used only when the following conditions are met:

(a) Reference datum information is received indicating the use of the CGCS2000 datum;

(b) RAIM information is received, and the horizontal position accuracy is less than 10 meters;

(c) The antenna center positions of the internal and external GNSS receivers are within 26 meters of each other;

(d) The input format complies with the requirements of IEC 61162-1, including the mode indicator and checksum.

(4) Identification

The MMSI shall be used to identify the ship and its messages. If an MMSI is programmed, the equipment shall transmit only that MMSI.

The equipment shall provide a default MMSI number of "000000000", indicating it is not a valid MMSI.

The equipment shall check if the programmed MMSI falls within the range of 200000000 to 799999999 or 98200000 to 987999999. If it does not, the equipment shall reject the programming and shall not transmit.

The equipment shall have the capability for the MMSI and the ship identification number to be permanently written once and shall not be modifiable thereafter.

(5) AIS information

① Information content

The information provided by the AIS shall include:

(a) Static information (24A and 24B)

The provided static information shall include:

- MMSI;
- name of ship;
- type of ship;
- vendor ID (optional);
- Call sign ;

- dimensions of ship and reference for position.

The default value for vessel type shall be 37 (Pleasure Craft). Default values for other static data shall clearly indicate that the equipment has been properly initialized. In particular, the default MMSI shall be set to 000000000, and the equipment shall be designed to inhibit transmission with this default value.

(b) Dynamic information

The list of dynamic information includes the following:

- Ship's position with accuracy indication and integrity status;
- UTC at the time of position generation;
- COG;
- SOG;
- Heading (optional).3) Safety-related short messages

(c) Safety-related short messages

It shall not transmit safety-related short messages as defined in ITU-R M.1371-5. (Note: IMO COMSAR.1/Circ.46:2009-02 recommends that "safety-related configured messages should NOT be included in the AIS equipment.")

(d) Configuration information

The following information regarding configuration and active options shall be available within a specific device:

- AIS Class B "CS" unit;
- Availability of Minimum Keyboard/Display (MKD) device;
- Capability to process Channel Management Message 22.

② Information Message reporting intervals

If a transmission time slot is available, the "CS" Class B AIS shall transmit the Position

Report (Message 18) at the following reporting intervals:

- 30 s,if SOG ＞ 2kn , and
- 3 min,if SOG ≤ 2kn.

If a transmission time slot is available, upon receiving an assignment command via Message 23, it shall override the current reporting interval. Commands requesting a reporting interval of less than 5 s may be ignored.

The Static Data sub-messages 24A and 24B shall be transmitted every 6 min, independent of the position report. Message 24B shall be transmitted within 1 min after the transmission of Message 24A.

③ Initialization period

The AIS shall start transmitting position reports within the following ranges:

- Cold start: 30 min;
- Warm start (if off for less than 1 h): 5 min;
- short signal loss (GNSS signal lost for less than 5 min):resume within a time of twice the reporting interval.

(6) Alarms, indications, and backup arrangements

① Integrity and protection

The Class B "CS"AIS shall be equipped with built-in integrity tests (BIIT). The BIIT shall run continuously or at appropriate intervals simultaneously with the standard functions of the equipment.

If any failure or malfunction is detected that will significantly reduce integrity or stop operation of the Class B "CS" AIS, a visual indication shall be given This includes the detection of background noise above -77 dBm
The Class B "CS" AIS installation, when operating, shall not be damaged by the effects of open-circuited or short-circuited antenna terminals.

② Transmitter shutdown procedure

An automatic transmitter shutdown shall be provided in the case where a transmitter does not discontinue its transmission within 1 s of the end of its nominal transmission. This procedure shall be independent of the operating software.

③ Position sensor fallback conditions

The priorities and affected position reporting data shall be as shown in Table 5.2.2.(6)(1).

Table 5.2.2. (6) (1) Position Sensor Backup Conditions

Priority	**Position Sensor Status**		**Affected Data in Message 18**			
			Position Accuracy Flag	**Date Format**	**RAIM Flag**	**Position Longitude/Latitude**
1.	External DGNSS in use (correct) [a]		1[d]	UTC-s	1/0[d]	Longitude/Latitude
2.	Internal DGNSS in use (correct, Message 17)		1[d]	UTC-s	1/0[d]	Longitude/Latitude
3.	Internal DGNSS in use (correct, e.g., Beacon) [c]		1[d]	UTC-s	1/0[d]	Longitude/Latitude
4.	External GNSS in use (uncorrected) [a]		0[d]	UTC-s	1/0[d]	Longitude/Latitude
5.	Internal GNSS in use (uncorrected) [b]		0[d]	UTC-s	1/0[d]	Longitude/Latitude
6.	No sensor position in use	Manual position input	N/A	61	N/A	Not transmitted
		Dead reckoning position		62		Not transmitted
		No position		63		Not transmitted

a Applicable only if an external GNSS receiver input is provided, and usable only when the conditions specified in 2.9 are met.

b Applicable to all configurations (minimum requirement).

c Applicable only if an internal beacon receiver is (optionally) provided.

d Use "1" if RAIM is available, otherwise use the default value "0".

If RAIM is available (indicated by a GBS sentence or equivalent information), the position accuracy flag shall be evaluated using Table 5.2.2.(6)(2).

Table 5.2.2.(6)(2) Use of the Position Accuracy Flag

		PA Flag	RAIM Flag
Uncorrected	No RAIM, GBS not provided	0	0
	GBS provided, expected error < 5m	1	1
	GBS provided expected error > 5m	0	1
Correct	No RAIM, GBS not provided	0	0
	GBS provided, expected error < 15m	1	1
	GBS provided, expected error > 15m	0	1

If the GNSS sensor is invalid, the equipment shall not transmit the scheduled Messages 18 and 24 unless interrogated by a base station. (Note: In this case, the synchronization process does not consider range delay.)
The "CS" Class B AIS shall automatically select the available position source with the highest priority. If data availability changes, the Class B "CS" AIS shall maintain the position source for the next scheduled position report and automatically switch to the position source with the highest available priority. During the switch of position sources, the report shall use the last valid position data. 2.12.4 SOG / COG sensor backup conditions.

The source for SOG/COG information and position must be the same and shall follow the same backup rules. This is to avoid transmitting information referenced to different points on the ship.

④ SOG and COG sensor fallback conditions

SOG/COG information shall be of the same source as position and follow the same fallback rules. This is to avoid transmission of information referenced to different points on the ship.

(7) User interface

① Indications and display

The Class B "CS" AIS shall be provided with the following indicators.

(a) Power: The power is ON and full functionality is operational (transmitting and receiving correctly).

(b) Transmission timeout: The "CS" Class B AIS equipment has not transmitted a position

report during the last two reporting intervals.

(Note: Reasons why the nominal reporting interval cannot be maintained, e.g., Message 23 silent period, high VDL load.)

(c) Fault: A fault is detected by the BIIT. (See "Integrity and Protection" above)

If a display for received messages is provided, the display shall:

(d) Display received Message 12 and Message 14, as well as position reports from AIS-SART in activation mode.

(e) Not display messages addressed to other stations.

② Static data input

A method for entering and verifying static data shall be provided before use. The MMSI, ship identification number, and vendor ID shall be permanently written once into the AIS equipment and shall not be alterable by any means.

③ External interfaces

To enable a user to access, select and display the information on a separate system, the Class B "CS" AIS may be provided with an interface. If implemented, the formats and protocol for this data stream should be as defined by IEC 61162-1. If provided, this interface shall not output information addressed to other stations. Additional interfaces may be implemented such as IEC 61162-450.
The Class B "CS" AIS may be provided with an interface to input sensor data. If provided, an input interface for position sensor data shall be compliant with IEC 61162-1.

(8) Protection from invalid control commands

The Class B "CS" AIS shall not accept control commands sent from stations with invalid base station MMSI. Before accepting and processing the Messages 17, 20, 22 and 23, the unit shall check the MMSI of the sender station. When the MMSI is "00xyyyyy" where ×is between 2 and 7, the unit shall accept and process the received command, otherwise the unit shall ignore it .

(9) Event log

The AIS equipment shall incorporate a security mechanism to detect the disabling of the equipment and to prevent unauthorized alteration or input of transmitted data. It shall comply with IMO Resolution MSC.43(64) to prevent the transmission of unauthorized data.

The AIS equipment shall automatically log all periods during which position reports are not transmitted at the required reporting interval for a duration exceeding 15 minutes, e.g., when the power is off, or when the equipment is not transmitting for other reasons.

The AIS equipment shall record, in non-volatile memory, instances where the equipment is continuously inoperative for more than 15 minutes over the most recent 18 months, logging the UTC time and duration of the event. The logged data shall be displayable on the MKD and the most recent 10 logs can be output using a TRL sentence. The user shall not have permission to alter any information recorded in the event log.

The transmission of position reports in response to interrogations shall not be used as a functional indicator. Equipment unable to automatically transmit position reports and static data shall be considered inoperative.

The equipment shall store dynamic position messages with tag block for at least 3 months and provide a means for export.

The equipment shall store the following alarm information for at least 18 months:

TX fault (BIIT ID 1);

VHF antenna VSWR out of limit (BIIT ID 2);

General fault (BIIT ID 6);

UTC synchronization invalid (BIIT ID 7);

Position sensor not used (BIIT ID 26)

(10) Uninterrupted position reporting

The equipment shall be capable of supporting an uninterrupted position reporting function in the absence of an external power supply, with the following specific requirements:

① The equipment shall be equipped with a built-in, non-rechargeable primary battery. When external power is lost, it shall automatically switch to battery-powered mode, transmit

Message 18 at the next dynamic reporting time, and subsequently transmit Message 18 at a reporting interval of every 24 hours. The communication state field of Message 18 shall be filled with the fixed value 1100000000000000111 to indicate that the equipment is operating in battery mode. Normal AIS operation shall resume automatically upon restoration of external power;

② The battery shall be capable of supporting continuous equipment operation in battery mode for not less than 3 years;

③ The battery replacement cycle shall not exceed 3 years, and the battery service life shall be not less than 5 years;

④ The battery shall have a label indicating its production date and expiration date. The equipment casing shall have a clear marking indicating the battery expiration time.

The test power supply shall be within ±3% of the normal voltage as defined by the manufacturer. The manufacturer shall provide evidence of the self-discharge rate of the built-in battery and its available capacity at a low temperature of -20 ℃. Battery replacement shall be performed by the manufacturer or its authorized agent under the surveyor's supervision.

(11) Prohibition of unauthorized modification of static information

Static information shall be entered during the installation of the AIS equipment. Modification of static information shall only be necessary when the ship's name is changed or the vessel type is altered;

Static information shall be written into the AIS equipment via an external interface and shall not be alterable via the man-machine interface.

(12) Automatic recording of power-on/off time

The AIS equipment shall be capable of recording and storing the power-on and power-off times for a minimum of the most recent 10 instances. Furthermore, the equipment shall query its operational status every 5 minutes and record the most recent time it was in an operational state;

The recording format shall be: Power-on records as "YYYY-MM-DD HH:MM:SS Power-On", power-off records as "YYYY-MM-DD HH:MM:SS Power-Off", and operational status records as "YYYY-MM-DD HH:MM:SS Operational";

The power-on/off records shall be viewable via the man-machine interface and can also be exported to removable storage media via an external interface.

6 Materials and Components

Raw materials and parts and components of products shall be controlled in accordance with the relevant requirements of CCS current specifications.

7 Type Tests

7.1 General provisions

The Class B Automatic Identification System shall be type-approved by CCS. The issuance, maintenance, modification, renewal, and cancellation of the Type Approval Certificate shall follow the relevant requirements of Chapter 3, Part 1 of the *Rules for Classification of Sea-Going Steel Ships*.

7.2 Selection of typical samples and test arrangement

The model and specification of the test sample are technically representative and cover the scope of products applying for type approval. The test sample(s) shall be selected on-site at the product manufacturer's premises by a CCS surveyor.

7.3 Testing organization

Type approval tests shall be conducted by a testing organization approved by CCS. The testing organization shall have obtained internationally/nationally recognized laboratory accreditation.

When determining the testing organization, full consideration shall be given to the conditions required for each test stipulated in the technical regulations. Written documentation shall be submitted and confirmed by the CCS surveyor.

7.4 The type approval certificate shall clearly specify the battery type, model, voltage, capacity, manufacturer, etc.

7.5 Type approval test items and requirements

See the Schedule for type approval test items.

Table 7.5 (1) Environmental Condition Test Items as per IEC 60945

No.	Test items	Test methods	Description
1.	Ergonomics and HMI check	IEC 60945, 6.1	May be combined with performance tests
2.	Hardware	IEC 60945, 6.2	May be combined with performance tests
3.	Software	IEC 60945, 6.3	May be combined with performance tests
4.	Inter-unit connection	IEC 60945, 6.4	May be combined with performance tests
5.	Extreme power supply variation test	IEC 60945, 7.1	Normal test temperature
6.	Excessive power supply conditions	IEC 60945, 7.2	
7.	Warm dry, including extreme power supply conditions	IEC 60945, 8.2 & 7.1	
8.	Warm damp	IEC 60945, 8.3	
9.	Low temperature, including extreme power supply conditions	IEC 60945, 8.4 & 7.1	
10.	Vibration and shock tests	IEC 60945, 8.7, Implementation Guidelines 5.2	
11.	Water (rain and spray) test for antenna parts	IEC 60945, 8.8	
12.	Salt spray test	IEC 60945, 8.12	
13.	Conducted emission test	IEC 60945, 9.2	
14.	Radiated emission test at enclosure port	IEC 60945, 9.3	
15.	Immunity of conducted disturbance induced by radio-frequency field	IEC 60945, 10.3	
16.	Immunity to radiated RF electromagnetic fields	IEC 60945, 10.4	
17.	Immunity to electrical fast transients	IEC 60945, 10.5	
18.	Immunity to surges	IEC 60945, 10.6	
19.	Immunity to short-term changes of the supply	IEC 60945, 10.7	
20.	Immunity to power supply fault	IEC 60945, 10.8	
21.	Electrostatic discharge immunity	IEC 60945, 10.9	
22.	Noise and audible signals	IEC 60945, 11.1	
23.	Safe distance of magnetic compass	IEC 60945, 11.2	
24.	Protection against touching dangerous voltages	IEC 60945, 12.1	For equipment installed inside compartments, the enclosure shall have a minimum IP rating of IP20
25.	Emissions from Visual Display Units (VDU)	IEC 60945, 12.3	When applicable

No.	Test items	Test methods	Description
26.	Withstand voltage test	Clause 2.14 of GD019-2024	Complete machine test (only applicable to power supply units above 50V)
27.	Insulation resistance measurement	Clause 2.3 of GD019-2024: Receiver Autonomous Integrity Monitoring (RAIM)	
28.	Undervoltage test	Implementation Guidelines 5.3	
The performance inspection/test items combined with environmental conditions test shall be carried out according to the following steps: • Functional check: Alarm function check, message transmission and reception; • Performance tests: Frequency error, carrier output power, reference sensitivity.			

Table 7.5 (2) Equipment Function and Performance Test Items

S/N	Test items		Test methods	Remarks
1	Function test		According to requirements in Clause 5.2 of the Guidelines	Complete unit function
2	Operational tests	General tests	IEC 62287-1 10.1, Implementation Guidelines 6.1	
3		Modes of operation	IEC 62287-1 10.2, Implementation Guidelines 6.2	
4		Messages exceeding one time period	IEC 62287-1 10.3, Implementation Guidelines 6.3	
5		Channel selection	IEC 62287-1 10.4, Implementation Guidelines 6.4	
6		Internal GNSS receiver	IEC 62287-1 10.5, Implementation Guidelines 6.5	
7		AIS information	IEC 62287-1 10.6, Implementation Guidelines 6.6	
8		Initialisation period	IEC 62287-1 10.7, Implementation Guidelines 6.7	
9		Alarms and indications, fall-back arrangements	IEC 62287-1 10.8, Implementation Guidelines 6.8	
10		User interface	IEC 62287-1 10.9, Implementation Guidelines 6.9	
11	Physical tests	TDMA transmitter: frequency error	IEC 62287-1 11.1.1, Implementation Guidelines 7.1.1	
12		TDMA transmitter: carrier power	IEC 62287-1 11.1.2, Implementation Guidelines 7.1.2	
13		TDMA transmitter: transmission spectrum	IEC 62287-1 11.1.3, Implementation Guidelines 7.1.3	
14		TDMA transmitter: modulation accuracy	IEC 62287-1 11.1.4, Implementation Guidelines 7.1.4	
15		TDMA transmitter: transmitter output power	IEC 62287-1 11.1.5, Implementation Guidelines 7.1.5	

S/N	Test items		Test methods	Remarks
		versus time function		
16		TDMA receiver: sensitivity	IEC 62287-1 11.2.1, Implementation Guidelines 7.2.1	
17		TDMA receiver: error behaviour at high input levels	IEC 62287-1 11.2.2, Implementation Guidelines 7.2.2	
18		TDMA receiver: definition	IEC 62287-1 11.2.3, Implementation Guidelines 7.2.3	
19		TDMA receiver: adjacent channel selectivity	IEC 62287-1 11.2.4, Implementation Guidelines 7.2.4	
20		TDMA receiver: spurious response rejection	IEC 62287-1 11.2.5, Implementation Guidelines 7.2.5	
21		TDMA receiver: intermodulation response rejection	IEC 62287-1 11.2.6, Implementation Guidelines 7.2.6	
22		TDMA receiver: blocking or desensitisation	IEC 62287-1 11.2.7, Implementation Guidelines 7.2.7	
23		Conducted spurious emissions:spurious emissions from the receiver	IEC 62287-1 11.3.1, Implementation Guidelines 7.3.1	
24		Conducted spurious emissions: spurious emissions from the transmitter	IEC 62287-1 11.3.2, Implementation Guidelines 7.3.2	
25	Specific tests of link layer	TDMA synchronization: Synchronisation test sync mode 1	IEC 62287-1 12.1.1, Implementation Guidelines 8.1.1	
26		TDMA synchronization: Synchronisation test sync mode 2	IEC 62287-1 12.1.2, Implementation Guidelines 8.1.2	
27		TDMA synchronization: synchronisation test with UTC	IEC 62287-1 12.1.3, Implementation Guidelines 8.1.3	
28		Carrier sense test: threshold level	IEC 62287-1 12.2.1, Implementation Guidelines 8.2.1	
29		Carrier sense test: carrier sense timing	IEC 62287-1 12.2.2, Implementation Guidelines 8.2.2	
30		VDL state/reservations	IEC 62287-1 12.3, Implementation Guidelines 8.3	
31		Data encoding (bit stuffing)	IEC 62287-1 12.4, Implementation Guidelines 8.4	
32		Frame check sequence	IEC 62287-1 12.5, Implementation Guidelines 8.5	

S/N	Test items		Test methods	Remarks
33		Slot allocation (channel access protocol) Autonomous mode allocation	IEC 62287-1 12.6.1, Implementation Guidelines 8.6.1	
34		Assigned operation: assignment priority	IEC 62287-1 12.7.1, Implementation Guidelines 8.7.1	
35		Assigned operation: entering rate assignment	IEC 62287-1 12.7.2, Implementation Guidelines 8.7.2	
36		Assigned operation: return from rate assignment	IEC 62287-1 12.7.3, Implementation Guidelines 8.7.3	
37		Assigned operation: reverting from quiet mode	IEC 62287-1 12.7.4, Implementation Guidelines 8.7.4	
38		Assigned operation: retry of interrogation response	IEC 62287-1 12.7.5, Implementation Guidelines 8.7.5	
39		Message format: received messages	IEC 62287-1 12.8.1, Implementation Guidelines 8.8.1	
40		Message format: transmitted messages	IEC 62287-1 12.8.2, Implementation Guidelines 8.8.2	
41	Specific tests of network layer	regional area designation by VDL message	IEC 62287-1 13.1, Implementation Guidelines 9.1	
42		regional area designation by serial message or manually	IEC 62287-1 13.2, Implementation Guidelines 9.2	
43		management of received regional operating settings: replacement or erasure of dated or remote regional operating settings	IEC 62287-1 13.3.1, Implementation Guidelines 9.3.1	
44		management of received regional operating settings: channel management by addressed message 22	IEC 62287-1 13.3.2, Implementation Guidelines 9.3.2	
45		management of received regional operating settings: invalid regional operating areas	IEC 62287-1 13.3.3, Implementation Guidelines 9.3.3	
46		management of received regional operating settings: continuation of autonomous mode reporting rate	IEC 62287-1 13.3.4, Implementation Guidelines 9.3.4	
47		management of received regional operating settings: other conditions	IEC 62287-1 13.3.5, Implementation Guidelines 9.3.5	
48	Prohibition of unauthorized modification of		Technical Regulations, Chapter 5, Part 4	

S/N	Test items	Test methods	Remarks
	static information		
49	Automatic recording of power-on/off time	Technical Regulations, Chapter 5, Part 4	

8 Unit/batch inspection

For products leaving the factory, CCS requires post-type-approval single item/batch survey and the issuance of a Marine Product Certificate. The product certificate shall clearly specify the battery type, model, voltage, capacity, manufacturer, etc.

After obtaining type approval, the manufacturer shall control the production and testing processes in accordance with the quality control documents submitted during approval, conduct the specified factory tests on each marine product, and issue a factory test report for each unit. Based on review of the factory test report, the CCS surveyor shall sample 5%, but not fewer than 2 units, for survey. The single item/batch survey after approval shall at least include the following tests:

- Appearance inspection;

- Software version verification;

- Functional verification test: alarm function check, message transmission and reception;

- Performance check: frequency error, carrier output power, reference sensitivity;

If the surveyor deems it necessary, the test items and sampling quantity can be increased.