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COMMENTED VERSION

INTERNATIONAL STANDARD

colour inside

Global maritime distress and safety system (GMDSS) – Part 4: Inmarsat-C ship earth station and Inmarsat enhanced group call (EGC) equipment – Operational and performance requirements, methods of testing and required test results

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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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This commented version (CMV) of the official standard IEC 61097-4:2024 edition 4.0 allows the user to identify the changes made to the previous IEC 61097-4:2012+AMD1:2016+AMD2:2019 CSV edition 3.2. Furthermore, comments from IEC TC 80 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

IEC 61097-4 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2012, Amendment 1:2016 and Amendment 2:2019. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) the addition of a technical requirement in 5.5 for operation in the presence of an interfering signal, with associated test, resulting from new IMO performance standards given in resolution MSC.513(105). **1**

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

Draft	Report on voting
80/1102/FDIS	80/1113/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 61097 series, published under the general title *Global maritime distress and safety system (GMDSS)*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document 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.

~~INTRODUCTION to Amendment 2~~

~~NOTE This amendment adds a requirement for an interface for alert management and removes the requirement to produce a printed copy of received safety information providing there is an interface to other navigation display equipment. This results from amendments to the performance standards for enhanced group call equipment agreed by the International Maritime Organization in resolution MSC.431(98) in 2017. It can be noted that the technical provisions for the interface for the transfer of received data to other navigation display equipment were included in IEC 61097-4:2012/AMD1:2016.~~

GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS) –

Part 4: Inmarsat-C ship earth station and Inmarsat enhanced group call (EGC) equipment – Operational and performance requirements, methods of testing and required test results

1 Scope

This part of IEC 61097 specifies the performance requirements and methods of testing for Inmarsat-C ship earth stations (SES) capable of transmitting and receiving direct-printing communications, and for enhanced group call (EGC) receivers, for use in the GMDSS and for use for long-range identification and tracking (LRIT). The available variants are:

Class 0: An EGC receiver, either stand-alone or an element of a GMDSS installation in accordance with the Inmarsat design and installation guidelines (DIGs) for GMDSS installations.

Class 1: A basic SES providing shore-to-ship and ship-to-shore message transfer only.

Class 2: As class 1 but with EGC as an alternative to shore-to-ship transfer using a shared receiver.

Class 3: As class 1 but with EGC using an independent receiver.

NOTE 1 The 34th session of the IMO Sub-Committee on Radiocommunications decided that class 2 equipment would be adequate to provide sufficient availability for the reception of maritime safety information for the GMDSS.

This document complies with IMO performance requirements stated in the normative references, Inmarsat technical characteristics and test procedures, and IEC 60945 general requirements except where modifications are explicitly stated in this document. Technical characteristics essential to GMDSS and LRIT operation as defined by the IMO are identified.

All text of this document, whose wording is identical to that in IMO SOLAS Convention 1974 as amended in 1988 and Resolutions ~~A.807(19)~~ MSC.513(105), MSC.263(84) and MSC.306(87) is printed in *italics* and reference made to the Resolution/Recommendation and subclause number.

This document covers equipment construction and testing. Matters relating to installation ~~may also~~ can be found in the Inmarsat Maritime design and installation guidelines (see Bibliography). Those to be found in IMO Resolutions ~~A.807(19)~~ MSC.513(105), MSC.263(84) and MSC.306(87) are reproduced in Annex A.

Responsibility for type approval of Inmarsat-C and Inmarsat-EGC is vested in Inmarsat by IMO Resolutions ~~A.807(19)~~ MSC.513(105) and MSC.306(87) (see 4.2.1). Therefore, this document does not reproduce Inmarsat test procedures in full but refers to where they are given in Inmarsat documentation cited in the normative references to this document (Annex C).

NOTE 2 For the purposes of this document the terms Inmarsat C, Inmarsat-C, Inmarsat Standard-C, Standard-C refer to the same equipment.

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 60945:2002, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

IEC 61108 (all parts), *Maritime navigation and radiocommunication equipment and systems – Global navigation satellite systems (GNSS)*

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

IEC 62923-1, *Maritime navigation and radiocommunication equipment and systems – Bridge alert management – Part 1: Operational and performance requirements, methods of testing and required test results*

IEC 62923-2, *Maritime navigation and radiocommunication equipment and systems – Bridge alert management – Part 2: Alert and cluster identifiers and other additional features*

IMO, *International Convention for the safety of life at sea (SOLAS),1974 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.807(19):1995, *Performance Standards for INMARSAT-C ship earth stations capable of transmitting and receiving direct-printing communications as amended by Resolution MSC.68(68) Annex 4*~~

IMO Resolution MSC.263(84):2008, *Revised performance standards and functional requirements for the long-range identification and tracking of ships.*

IMO Resolution MSC.302(87):2010, *Performance standards for bridge alert management*

IMO Resolution MSC.306(87):2010, *Revised performance standards for enhanced group call (EGC) equipment as amended by resolution MSC.431(98):2017*

IMO Resolution MSC.513(105), *Performance standards for INMARSAT-C ship earth stations capable of transmitting and receiving direct-printing communications*

Inmarsat, *Inmarsat C System definition manual (SDM) Volume 2 – Part 2, Application Note 2, Position reporting service*

Inmarsat, *Inmarsat C System definition manual (SDM) Volume 2 – Part 2, Application Note 3, Application developers guide to data reporting and polling*

Inmarsat, *Inmarsat C System definition manual (SDM) Volume 3 – Part 2, Chapter 2, Mobile earth station technical requirements*

Inmarsat, *Inmarsat C System definition manual (SDM) Volume 3 – Part 2, Chapter 5, Ship earth station technical requirements*

Inmarsat, *Inmarsat C System definition manual (SDM) Volume 3 – Part 2, Chapter 8, Technical requirements for an EGC receiver*

~~Inmarsat, *Recommended test procedures (RTP) for the type approval of Inmarsat C mobile earth stations*~~

Inmarsat, *Inmarsat C System definition manual (SDM) Change Notice CN150, ATCt signals and other adjacent interferers*

3 Terms and definitions 2

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

4 Performance requirements

4.1 Overview

Subclauses 4.2 through 4.4 of this document describe performance requirements directly attributable to IMO Resolutions ~~A.807(19) and~~ MSC.306(87) as amended by MSC.431(98) and MSC.513(105) as listed in the normative references. Subclause 4.5 is provided to highlight those requirements of IMO Resolution A.694(17) which are not included in the normal Inmarsat requirements for Inmarsat-C SES type approval. Subclause 4.6 describes other requirements which are required to make the equipment suitable for GMDSS applications. Subclause 4.7 describes performance requirements attributable to IMO Resolution MSC.263(84) for long-range identification and tracking.

4.2 Non-operational requirements

4.2.1 General

~~*(A.807(19) A1.1/MSC.306(87) A1.1) The Inmarsat Standard C ship earth station installation capable of transmitting and receiving direct-printing communications, and*~~ *(MSC.306(87) A1.1) The enhanced group call equipment to be used in the GMDSS* shall *comply with the general requirements set out in Assembly resolution A.694(17)* as detailed in IEC 60945 and this document. 3

(MSC.513(105) A1.1) The Inmarsat-C ship earth station installation provided to meet a requirement for a ship earth station in SOLAS regulations IV/8.1.4, 9.1.3.3, 9.4.2, 10.1.1 or 10.1.4.3 shall *comply with the general requirements set out in resolutions A.694(17). It should be capable of transmitting and receiving automated telegraphy communications in compliance with the relevant ITU-R recommendation on direct-printing telegraphy. In addition, the Inmarsat-C ship earth station* shall *conform to the following minimum requirements.*

(MSC.513(105) A1.2) The performance of any enhanced group call facility provided by the ship earth station shall *be in accordance with the performance standards for enhanced group call equipment set out in resolution MSC.306(87) as amended by resolution MSC.431(98) and with the following minimum performance requirements.*

~~*(A.807(19) A2/*~~*(MSC.513(105) A2.1)/MSC.306(87) 2) The ship earth station and the EGC equipment* shall *be type-approved by Inmarsat and* shall *comply with the environmental conditions and electromagnetic compatibility requirements specified in IEC 60945.*

4.2.2 Warning of radiation hazard

~~(A.807(19))~~(MSC.513(105) A4) *In order to permit a warning of potential radiation hazards to be displayed in appropriate locations, a label* shall *be attached to the radome indicating the distances external to the radome at which radiation levels of 100 W/m^2, 25 W/m^2 and 10 W/m^2 exist. However, the distances which are within the radome need not be indicated.*

NOTE Owing to the low transmitted power of Inmarsat-C transmitters (less than 16 dBW) and the omnidirectional antenna used, this label is not normally required.

4.2.3 Power supply changeover

(See 6.2)

~~(A.807(19))~~(MSC.513(105) A5.2/MSC.306(87) A4.2) *Changing from one source of supply to another or any interruption of up to 60 s duration of the supply of electrical energy* shall *not require the equipment to be manually re-initialized and* shall *not result in loss of received messages stored in the memory.*

4.2.4 Installation

Requirements for installation of the equipment are given in Annex A. **4**

4.3 Operational requirements for ship earth stations

4.3.1 Capabilities

(See 6.3.1)

The equipment shall comply with regulations IV/8 through IV/10 of SOLAS 1974, as amended, which prescribe the capabilities of Inmarsat ship earth stations to meet the GMDSS requirements for ships in the various sea areas. The four capabilities are:

– *(SOLAS IV/8.1.~~5.1/~~4, IV/9.1.3.3 and IV/10.1.4.3) means of initiating the transmission of ship-to-shore distress alerts.*

– *(SOLAS IV/10.1.1~~.1~~) transmitting and receiving distress urgency and safety communications ~~using direct-printing telegraphy~~.*

– *(SOLAS IV/10.1.~~1.~~2) initiating and receiving distress priority calls.*

– *(SOLAS ~~IV/9.3.2/IV/10.1.1.4~~ IV/9.4.2, IV/10.4.1) transmitting and receiving general radiocommunications~~, using either radiotelephony or direct-printing telegraphy~~.*

~~NOTE In the case of this equipment only direct-printing telegraphy applies.~~ **5**

4.3.2 Ship station identity

(See 6.3.2)

~~(A.807(19))~~(MSC.513(105) A3.1) *No control external to the equipment* shall *be available for alteration of the ship station identity.*

4.3.3 Distress alerting

(See 6.3.3)

~~(A.807(19))~~(MSC.513(105) A3.2) *It* shall *be possible to initiate and make distress calls from the position from which the ship is normally navigated and from at least one other position designated for distress alerting.*

~~(A.807(19)~~(MSC.513(105) A3.3) *A distress alert* shall *be activated only by means of a dedicated distress button. This button* shall *not be any key of an ITU-T digital input panel or an ISO keyboard* ~~*provided on the equipment*~~ *associated with the equipment and* shall *be physically separated from functional buttons/keys used for normal operation. This button* shall *be a single button for no other purpose than to initiate a distress alert.* **6**

~~(A.807(19)~~(MSC.513(105) A3.4) *The dedicated distress button* shall:

.1 *be clearly identified, red in colour and marked "DISTRESS". Where a non-transparent protective lid or cover is used, it* shall *also be marked "DISTRESS; and*

.2 *be protected against inadvertent operation. The required protection of the distress button* shall *consist of a spring-loaded lid or cover permanently attached to the equipment by, for example, hinges. It* shall *not be necessary for the user to remove additional seals or to break the lid or cover in order to operate the distress button. The operation of the distress button* shall *generate a visible and audible indication. The distress button* shall *be kept pressed for at least three seconds. A flashing light and an intermittent acoustic signal* shall *start immediately. After the three seconds, the transmission of the distress alert is initiated and the indication* shall *become steady and the acoustic signal* shall *stop.*

~~(A.807(19) A3.5)~~(MSC.513(105) A3.5) *The distress alert initiation* shall *require at least two independent actions. Lifting of the protective lid or cover is considered as the first action. Pressing the distress button as specified above is considered as the second independent action.*

~~(A.807(19)~~(MSC.513(105) A3.6) *The equipment* shall *indicate the status of the distress alert transmission.*

~~(A.807(19)~~(MSC.513(105) A3.7) *It* shall *be possible to interrupt and initiate distress messages at any time. It* shall *be possible to interrupt repetitive transmissions of distress messages. Such operation* shall *not interrupt the transmission of a distress alert or distress message in progress but* shall *prevent repetitive transmissions of a distress message.*

It shall be possible to select the content of, but not initiate a distress alert using the equipment keyboard or other means, before depressing one of the dedicated buttons to initiate the distress alert. It shall also be possible to activate an undesignated (see Note) distress alert by depressing one of the buttons, at any time.

NOTE Undesignated – unspecified distress alert, i.e. the default setting. All other selectable alerts are "designated".

4.3.4 Position updating

(See 6.3.4)

~~(A.807(19) A3.8): Facilities~~ shall ~~be provided to automatically update the ship's position and the time at which the position was determined from a suitable electronic position-fixing aid which may be an integral part of the equipment. For equipment which does not have an integral position-fixing aid, such facilities~~ shall ~~include a suitable interface conforming to IEC 61162.~~

(MSC.513(105) A3.8) To enable updating of the position:

.1 *the status of the position update* shall *be visible to the operator (e.g. offline, manual or automatic);*

.2 *if position data is being updated automatically, a caution* shall *be raised if no update has been performed for a period of 10 minutes. The caution* shall *be removed by receiving new position data;*

.3 *if an integral electronic position-fixing aid is not provided, the equipment* shall *have an interface conforming to the appropriate international standard;*

.4 *the equipment* shall *have facilities for manually entering the ship's position and the time of the position fix;*

.5 if the ship's manually-set position is older than four hours, a caution shall *be raised. The caution* shall *be removed by inputting or receiving new position data; and*

.6 if the ship's position is older than 24 hours, the position is clearly identified with date and time of the fix in UTC for distress alerting purposes. **7**

The integral electronic position-fixing aid shall comply with the applicable requirements of the IEC 61108 series.

As a minimum, the interface shall support the sentences GNS, RMC and ZDA described in IEC 61162-1.

~~*(A.807(19) A3.9): Provision* shall *also be made for manual entry of position information and of the time at which the position was determined.*~~

~~*(A.807(19) A3.10): An alarm* shall *be activated when no position data is received from the electronic position-fixing aid or, in the case of manual input, the position information is over 4 hours old. Any position information not updated for more than 24 hours* shall *be clearly identified.* See also 3.4.3.~~

NOTE Subclause 3.3.7, which is referenced in the Inmarsat-C SDM, is 4.3.3 in this edition of this document.

4.4 Operational requirements for EGC receivers

4.4.1 Capabilities

(See 6.4.1)

The equipment shall comply with regulations IV/7 and IV/10 of SOLAS 1974, as amended, which prescribe the capabilities of EGC receivers to meet the GMDSS requirements for ships in the various sea areas. The two capabilities are:

– *(SOLAS IV/7.1.~~5~~4) a radio facility for reception of maritime safety information by the Inmarsat enhanced group calling system.*

– *(SOLAS IV/10.1.1.3) an Inmarsat ship earth station capable of maintaining watch for shore-to-ship distress alerts, including those directed to specifically defined geographical areas.*

4.4.2 General

(See 6.4.2)

(MSC.306(87) A1.3 as amended by resolution MSC.431(98)) Alternatively to the requirement in paragraph MSC.306(87) A1.2, the equipment need not provide means to produce a printed copy of received information if it is installed in combination with an interface connecting it to navigation equipment that is compliant with resolution MSC 252(83), as amended, on Revised Performance standards for integrated navigation systems (INS). Provisions for interconnection to a shipborne integrated radiocommunication system (IRCS) when used in the GMDSS (resolution A.811(19)) shall *also be included.*

If no means are provided by the equipment to produce a printed copy of received information then the manufacturer's documentation shall clearly describe that the equipment can only be used when connected to equipment enabled for the display of enhanced group calls ~~in compliance with the applicable~~ as described in IEC 61924-2 ~~requirements~~.

~~NOTE The testing standard for compliance with INS (Resolution MSC 252(83)) is IEC 61924-2. The testing standard for compliance with IRCS (Resolution A.811(19)) is IEC 62940.~~

(MSC.306(87) A1.4) The enhanced group call installation may be either separate or combined with other installations. Elements of other installations, e.g. the antenna, low noise amplifier and down converter of the ship earth system, may be shared for the reception of enhanced group call messages.

4.4.3 Position and area code updating

(See 6.4.3)

(MSC.306(87) A3.1) The equipment shall *provide a visual indication that the ship's position has not been updated during the last 12 hours. It* shall *only be possible to reset this indication by revalidating the ship's position.* See also 4.3.4.

(MSC.306(87) A3.2) Means shall *be provided to enter the ship's position and current and planned NAVAREA/METAREA codes manually so that area group calls can be received. Means shall also be provided to enter current and planned coastal warning service coverage areas and different classes of messages. Optionally, the ship's position, as determined by the navigational equipment may be entered automatically and the NAVAREA/METAREA code automatically derived therefrom.*

NOTE NAVAREAs and METAREAs are geographical sea areas established for the purpose of co-ordinating the broadcast of navigational and meteorological safety information. The world is currently divided into 21 areas (I to XXI). The boundaries are shown in the IMO International SafetyNET Manual.

4.4.4 Indication of receipt of priority message

(See 6.4.4)

(MSC.306(87) A3.3) Provision shall *be made for a specific aural alarm and visual indication at the position from which the ship is normally navigated to indicate receipt of a distress or urgency priority EGC message. It* shall *not be possible to disable this alarm and it* shall *only be possible to reset it manually and only from the position where the message is displayed or printed.*

4.4.5 Indication of tuning and synchronisation

(See 6.4.5)

(MSC.306(87) A3.4) The equipment shall *indicate when it is not correctly tuned or synchronized to the enhanced group call carrier.*

4.4.6 Printing selection

(See 6.4.6)

(MSC.306(87) A3.5) Any message shall *be printed regardless of the character error rate of its reception. The equipment* shall *print a low-line mark if a character is received corrupted.*

(MSC.306(87) A3.6) Acceptance or rejection of service codes shall *be under the operator's control except that equipment* shall *always receive navigational and meteorological warnings and forecasts, search and rescue information, and shore-to-ship distress alerts, which are directed to a fixed or absolute geographical area in which the ship is operating.*

NOTE The service codes (C_2) are described in the IMO International SafetyNET Manual. They have similar meanings as the subject indicator characters (B_2) in the NAVTEX system described in the IMO NAVTEX Manual and Recommendation ITU-R M.540.

(MSC.306(87) A3.7) Means shall *be provided to prevent the reprinting of a message once it has been received without error.*

4.4.7 Printing device

(See 6.4.7)

(MSC.306(87) A3.8) The printing device shall *be capable of printing at least the standard International Alphabet Number 5 (IA5) character set. Other character sets are optionally used according to ISO 2022 standards.*

(MSC.306(87) A3.9) The printing device shall *be able to print at least 40 characters per line.*

(MSC.306(87) A3.10) The signal processor and printing device shall ensure that if a word cannot be accommodated in full on one line, it shall *be transferred to the next line. The printing device* shall *automatically feed five lines after completing the printed messages.*

(MSC.306(87) A3.11) A local audible alarm shall *be sounded to give advanced warning of the printing device "paper low" condition. It* shall *not be possible to confuse the sound of the "paper low" alarm with that of the distress or urgency alarm caused by the reception of a distress or urgency priority message.*

4.5 Performance related requirements from IEC 60945

(See 6.5)

The equipment shall comply with those subclauses of IEC 60945 appropriate to its equipment class. The subclauses of IEC 60945:2002 referenced below, amend or augment the corresponding requirements of the Inmarsat-C SDM.

– 4.1 *General*
– 4.2 *Design and operation*
– 4.3 *Power supply*
– 4.4 *Durability and resistance to environmental conditions* (see 4.2)
– 4.5 *Interference* (see 4.2)
– 4.6 *Safety precautions*
– 4.7 *Maintenance*
– 4.8 *Equipment manuals*
– 4.9 *Marking and identification*

4.6 Other requirements

(See 6.6)

Message display facilities shall be suitable for displaying received distress-related messages. It is recommended that the display facilities should comply with the corresponding requirements for EGC receivers in 4.4.6 and 4.4.7.

Any programming material or software that forms part of the equipment and which is necessary for meeting the GMDSS requirements shall be permanently installed in the equipment. Any software needed to fulfil any distress and safety requirements of the GMDSS shall not be stored on any medium which can be accessed, modified or corrupted.

Any ancillaries associated with Inmarsat-C equipment, such as visual display units, keyboards and printers, shall be available immediately on demand to service GMDSS functional requirements. These ancillaries shall also be provided with fixing arrangements to prevent unauthorized removal or disconnection.

4.7 Long-range identification and tracking

4.7.1 General

(See 6.7.1)

Long-range identification and tracking of ships (LRIT) is a requirement of regulation V/19-1 of SOLAS 1974 as amended.

NOTE 1 IEC 62729 contains general information on ~~requirements and testing for~~ LRIT.

For the purposes of LRIT the Inmarsat-C SES shall support the Inmarsat enhanced pre-assigned data reporting service (reserved access), the enhanced data reporting service (unreserved access), and the polling service.

NOTE 2 Enhanced and enhanced pre-assigned data reporting offers additional capabilities and features over the Inmarsat data reporting service particularly; use of an internal data reporting checksum, inclusion of the ship earth station identification to ensure unambiguous identification of stations, an acknowledgement mechanism managing multiple assignments inside the Ocean Region and across Ocean Regions, changing reporting intervals, controlling and querying assignments and status request facility to ensure reliable transfer.

4.7.2 Capabilities

4.7.2.1 Transmission of information

(See 6.7.2)

(MSC.263(84) A4.1.1) Shipborne equipment shall *be capable of automatically and without human intervention on board the ship transmitting the ship's LRIT information at 6-hour intervals to an LRIT Data Centre.*

(MSC.263(84) A4.4.1) When a ship is undergoing repairs, modifications or conversions in dry-dock or in port or is laid up for a long period, the master or the Administration may reduce the frequency of the transmission LRIT information to one transmission every 24-hour period or may temporarily stop the transmission of such information.

NOTE LRIT data centres are set up by governments, either individually or in cooperation with other governments. Administrations decide to which LRIT data centre ships entitled to fly their flag are required to transmit the LRIT information. The LRIT information is described in Table 1.

This requirement is achieved by the reserved data reporting service using a data network identity (DNID) and a member number to associate the LRIT information with an LRIT data centre. Information about the DNID and member number is downloaded by polling commands (see 4.7.2.2) under the control of an Administration.

There shall be no control external to the equipment to set up or remove DNIDs. However, facilities shall be provided to stop the transmission of LRIT information and to increase the intervals between transmissions to 24 h, by controls external to the equipment. Facilities shall also be provided to re-enable the transmissions at 6 h intervals. These facilities shall be security protected so that access can be restricted to the master only.

4.7.2.2 Remote configuration

(MSC.263(84) A4.1.2) Shipborne equipment shall *be capable of being configured remotely to transmit LRIT information at variable intervals (Pre-scheduled position reports).*

The equipment shall be capable of being remotely configured to transmit LRIT information at intervals ranging from a minimum of 15 min to periods of 6 h to the LRIT data centre, irrespective of where the ship is located and without human interaction on board the ship.

The equipment shall also be capable of being remotely configured to stop the transmission of LRIT information.

This requirement is achieved by the polling service and by using control/query commands supported by the enhanced pre-assigned data reporting service. The equipment shall support polling command types 00H to 0BH as described in the Inmarsat-C SDM Volume 2, Part 2, Application Note 3.

Configuration information, as described in the Inmarsat-C SDM Volume 2, Part 2, Application Note 3 shall be stored in non-volatile memory to allow recovery after a power outage. There shall be provision within the non-volatile memory to store at least 64 16-bit DNIDs.

4.7.2.3 On-demand reports

(MSC.263(84) A4.1.3) Shipborne equipment shall *be capable of transmitting LRIT information following receipt of polling commands (On-demand position reports).*

NOTE 1 On-demand position reports means transmission of LRIT information as a result of either receipt of polling command or of remote configuration of the equipment so as to transmit at intervals other than the preset ones.

The equipment shall be capable of responding to a request to transmit LRIT information on demand without human interaction on board the ship, irrespective of where the ship is located.

This requirement is achieved by the polling and data reporting service.

The equipment shall transmit the LRIT information within 8 min of receiving the polling command.

NOTE 2 The worst-case signalling exchange for a polling command takes 44 frames plus 1 min (7,3 min). MSC.263(84) A13 ~~requires~~ describes that on-demand information be provided to an LRIT data user within 30 min of the time that the LRIT data user requested the information.

4.7.3 Functionality

(See 6.7.3)

(MSC.263(84) A4.2) In addition to the provisions specified in 4.7.2, the shipborne equipment shall *provide the functionality specified in* Table 1.

Table 1 – Data to be transmitted from the shipborne equipment

Parameter	Comments
Identity of the ship	The identifier used by the shipborne equipment.
Position of the ship (latitude and longitude)	The Global Navigation Satellite System (GNSS) position (latitude and longitude) of the ship (based on the WGS 84 datum).
Date and time of the position provided	The date and time, indicated as Universal Coordinated Time (UTC), associated with the GNSS position. In the LRIT system this is known as Time Stamp 1. The equipment should be capable of transmitting the time associated with the GNSS position with each transmission of LRIT information.
NOTE The format of the data report is described in the Inmarsat-C SDM Volume 2, Part 2, Application Note 2. The enhanced data reporting protocol permits the 24-bit codes allocated to the ship earth station as "to-mobile" and "from-mobile" identifiers to be included, together with the 8-bit code identifier for the land earth station used. The category of the report is 01B (maritime position report). The latitude and longitude of the position is coded to an accuracy of 0,04 of a minute. The Macro Encoded Message (MEM code) is set to 11 (time of position). The date is coded as current or next month and day. The time is coded as hour and minutes to an accuracy of 2 min.	

4.7.4 Communication system

(See 6.7.4)

(MSC.263(84) A4.3) The shipborne equipment shall *transmit the LRIT information using a communication system which provides coverage in all areas where the ship operates.*

The Inmarsat-C shipborne equipment operates in the coverage area defined by Inmarsat which comprises the Pacific Ocean Region, Atlantic Ocean Region-West, Atlantic Ocean Region-East and Indian Ocean Region.

NOTE Each 16-bit data network identity (DNID) is associated with the 8-bit code of a land earth station (LES). In order for equipment to continue transmitting after a change of Ocean Region ~~it is necessary for~~ the equipment ~~to have stored~~ stores DNID/LES pairs of codes relevant to all Ocean Regions.

5 Technical characteristics

5.1 Overview

(See 6.8.1)

IMO Resolutions ~~A.807(19)~~ MSC.513(105) and MSC.306(87) appoint Inmarsat as the type approval authority for Inmarsat-C SES and Inmarsat-EGC (see 4.2.1). The Inmarsat-C SDM is, therefore, the primary source of technical characteristics for Inmarsat-C SES and EGC receivers for use in the GMDSS, but the amendments and additions given in 5.2 to 5.5 shall apply.

5.2 Environmental and electromagnetic compatibility requirement

(See 6.8.2)

Models of Inmarsat-C SESs and EGC receivers which are to be submitted for type approval for GMDSS use within the Inmarsat system shall be designed so as to operate over the following range of environmental conditions, which are consistent with the requirements as indicated of:

a) Inmarsat-C SDM, Volume 3, Part 2, Chapter 5 + Chapter 5, Annex A (referred to below as "Inmarsat"); or,

b) Inmarsat modified by IEC 60945 using the most stringent combined set of conditions; or,

c) IEC 60945.

Table 2 provides a summary of the Inmarsat environmental requirements as modified by IEC 60945. Annex C describes the tests to which the various environmental conditions are applied.

Table 2 – Environmental conditions

	Condition	Comment
a)	Ambient temperature	"Inmarsat" modified by 8.2~~/~~ and 8.4 of IEC 60945:2002
b)	Relative humidity	"Inmarsat" modified by 8.3 of IEC 60945:2002
c)	Spray	"Inmarsat" modified by 8.8 of IEC 60945:2002
d)	Ice	"Inmarsat"
e)	Precipitation	"Inmarsat" modified by 8.8 of IEC 60945:2002
f)	Wind	"Inmarsat"
g)	Solar radiation	"Inmarsat"
h)	Prime power variations AC mains supply	"Inmarsat"

	DC mains supply Battery supply	"Inmarsat" "Inmarsat" modified by 4.3.2 of IEC 60945:2002
j)	Vibration	"Inmarsat" modified by 8.7 of IEC 60945:2002
k)	Antenna inclinations	"Inmarsat"
l)	Induced acceleration	"Inmarsat"
m)	Velocity	"Inmarsat"
	Corrosion	8.12 of IEC 60945:2002
NOTE The letters a) to m) directly mirror the lettering used in the Inmarsat-C SDM, Volume 3, Part 2, Chapter 5, section 11.2.		

All Inmarsat-C equipment covered by this document shall comply with the electromagnetic compatibility requirements detailed in the tests in IEC 60945:2002, Clause 9 and Clause 10.

5.3 Radiated spurious emissions

The radiated spurious emissions requirement is described in Annex B.

5.4 Interfaces

(See 6.8.3)

(MSC.306(87) A6.3 as amended by resolution MSC.431(98)) All interfaces provided for communication with other navigation or communication equipment shall *comply with* IEC 61162-1.

(MSC.306(87) A6.1 as amended by resolution MSC.431(98)) The equipment shall *include at least one interface for the transfer of received data to other navigation display or integrated communications equipment.*

The equipment shall be provided with a data interface capable of transmitting the sentences SM1, SM2, SM3, SM4 and SMB according to IEC 61162-1.

(MSC.306(87) A6.2 as amended by resolution MSC.431(98)) The equipment shall *include an interface for alert management in accordance with resolution MSC.302(87) on Performance standards for bridge alert management.*

In addition to the sentences previously mentioned, the equipment shall be capable of communicating with the sentences ACN, ALC, ALF, ARC and HBT according to IEC 61162-1.

The equipment shall be capable of classifying, handling, displaying and reporting alerts as required in IEC 62923-1 and IEC 62923-2. In the BAM concept, the EGC receiver acts as an alert source.

The equipment shall be capable of releasing an alert with priority Warning and Category A with alert identifier 3122 on receipt of a distress or urgency priority EGC message.

NOTE 1 Warning is a short audible announcement repeated up to every 5 min until acknowledged by the operator, "Category A" refers to when acknowledgement is only possible at the source, "Alert identifier 3122" indicates a message received warning.

The alert title for the first ALF sentence for a distress priority EGC message (C_1 = 3) shall be "Distress RX". The additional information in the second ALF sentence shall be "Incoming distress. Check Inmarsat display".

The alert title for the first ALF sentence for an urgency priority EGC message (C_1 = 2) shall be "Urgency RX". The additional information in the second ALF sentence shall be "Incoming urgency ~~warning~~. Check Inmarsat ~~C~~ display". 8

NOTE 2 The priority codes (C_1) are described in the IMO International SafetyNET Manual.

The alert, if not acknowledged, shall be repeated as a warning after a limited time period not exceeding 5 min. Unacknowledged warnings shall not be changed to alarm priority.

5.5 Interfering signals

(See 6.8.4)

(MSC.513(105) A2.2) The Inmarsat-C receiver shall *be capable of operating in the presence of an interfering signal with the following characteristics: a wideband signal of bandwidth 5 MHz, occupying the band 1 512-1 517 MHz, at a power level of −30 dBm measured at the receiver input.* 9

6 Methods of testing and required test results

6.1 Overview

6.1.1 General

All tests carried out under Inmarsat control as per the applicable Inmarsat SDM will be acceptable and need not be repeated for compliance with this document.

NOTE Inmarsat test items given below relate to Inmarsat recommended test procedures (RTP) as described in Annex C. The given order of tests is logical regarding equipment build state and test location but is not critical and ~~may~~ can be changed if required.

6.1.2 Performance requirements

The equipment shall be tested for compliance with the performance requirements described in Clause 4 using the methods prescribed in 6.2 through 6.6.

6.1.3 Technical characteristics

The equipment shall be tested for compliance with the technical characteristics listed in Clause 5 using the methods prescribed in the Inmarsat documentation, but using the environmental conditions defined in Table 2, as indicated in 6.7.

6.2 Tests of non-operational requirements

(See 4.2)

With the equipment operating normally, and with a received message stored in the equipment, the power shall be removed for a period of 60 s, and then restored. On restoration of the power the equipment shall continue to operate normally, remain logged to the previous Ocean Region, and the stored message shall contain no additional errors.

6.3 Tests of operational requirements for ship earth stations

6.3.1 Capabilities

(See 4.3.1)

Compliance with the SOLAS regulations is checked by Inmarsat testing particularly:

– Inmarsat test item S8-B (distress alert activation), for means of initiating the transmission of ship-to-shore distress alerts;
– Inmarsat test items; 7-A (character codes), S7-B (display devices), 7-C (keyboard), 22-A (to-mobile message transfer), 23-A (distress alert transmission) and 23-B (distress alert message transfer) for transmitting and receiving distress and safety communications, distress priority calls and general radiocommunications.

6.3.2 Ship station identity

(See 4.3.2)

Check by inspection of the equipment and the manufacturer's documentation that no external control is available for alteration of the ship station identity.

6.3.3 Distress alerting

(See 4.3.3)

Check by inspection of the equipment and the manufacturer's documentation that a dedicated distress button is provided which is capable of being installed at a position on a ship from which the ship is normally navigated. Check that provisions have been made for a further dedicated button for use with the equipment suitable for installation on a ship at another position.

Check that the design and operation of the distress button conforms to the requirements and tests given for distress alert in 4.3.3.

Check that it is possible to select the content of a distress alert before initiating a distress alert but check also that it is possible to initiate a distress alert without selecting any content and that in this case the alert is undesignated.

NOTE The function of the distress alert activation is checked by Inmarsat test item S8-B.

6.3.4 Position updating

(See 4.3.4)

If the equipment includes a Global Navigation Satellite System receiver, check by inspection of the manufacturer's documentation that the position accuracy (static and dynamic), speed over the ground (SOG) accuracy, course over the ground (COG) accuracy, update rate, interference susceptibility and status indication comply with the requirements of the IEC 61108 series.

If the equipment has an interface for obtaining position information check that this supports the sentences GNS, RMC and ZDA described in IEC 61162-1.

Check that facilities are provided for manual entry of position.

By inhibiting the signal from a position fixing aid (internally provided or externally provided through an interface) check that a ~~warning~~ caution is activated when no position data is received for a period of 10 min. **10**

Check with a manual entry of position that a ~~warning~~ caution is activated after 4 h.

Check by not updating the position information in the equipment for 24 h that there is an indication that the position is over 24 h old.

NOTE See also 6.4.3 which tests for a further indication of whether the equipment includes an EGC receiver.

6.4 Tests of operational requirements for EGC receivers

6.4.1 Capabilities

(See 4.4.1)

Compliance with the SOLAS regulations is checked by the tests in 6.4.2 to 6.4.7.

6.4.2 General

(See 4.4.2)

The operation of the equipment is checked by Inmarsat testing particularly Inmarsat test items: E-4B (output devices), E-4D (memory capacity), E-4E (receiver addressing) and E-5A (distress messages).

Inspect the configuration of the receiver and note whether it is stand alone or combined with other equipment.

Inspect the configuration of the equipment and note whether it is intended to produce a printed copy of received information or be used in combination with other navigation equipment through an interface. If the equipment does not provide a printed copy of received information, check by inspection of the manufacturer's documentation that it clearly states that the equipment shall only be used when connected to an INS.

6.4.3 Position and area code updating

(See 4.4.3)

Check by not updating the position information in the equipment for 12 h that there is an indication that the position is over 12 h old. Check that this indication can only be reset by revalidating the position.

Check by inspection of the equipment that facilities are provided to manually enter NAVAREA/METAREA codes, coastal warning areas and subject indicators (type of message) for coastal warnings.

6.4.4 Indication of receipt of priority message

(See 4.4.4)

Compliance with the requirements for the alarm and indications is checked by Inmarsat test item E-5A (distress messages).

6.4.5 Indication of tuning and synchronisation

(See 4.4.5)

Compliance with the requirement for an indication when the equipment is not correctly tuned or synchronised is checked by Inmarsat test item E2-C (receiver tuning).

6.4.6 Printing selection

(See 4.4.6)

Compliance with the requirements for acceptance or rejection of EGC service code types is checked by Inmarsat test item E4-E (receiver addressing).

Compliance with the requirements for printing of messages is checked by Inmarsat test item E4-F (error detection) plus the following tests in the sequence given.

a) A numbered message is received twice: print-out shall be made only from the first reception.

b) A message with the same sequence number as in test 1 above, is received, but with one character changed: no print-out shall be made.

c) The same message with a new sequence number shall be received, but with one character error: print-out shall be made with that character replaced by a low line-mark.

d) The message as in test c) above, with the same sequence number shall be received correctly: print-out shall be made.

6.4.7 Printing device

(See 4.4.7)

Compliance with the requirements for printing devices is checked by Inmarsat test item E4-B (output devices).

6.5 Tests of performance related requirements from IEC 60945

(See 4.5)

The tests for the requirements of IEC 60945 are detailed in IEC 60945.

6.6 Tests of other requirements

(See 4.6)

Check the requirements by inspection of the equipment and the manufacturer's documentation.

6.7 Long-range identification and tracking

6.7.1 General

(See 4.7.1)

Check by inspection of the manufacturer's documentation that the equipment supports the enhanced pre-assigned data reporting service, the enhanced data reporting service and polling.

6.7.2 Capabilities

(See 4.7.2)

Check by inspection of the manufacturer's documentation that the operation of the equipment for polling and data reporting has been tested by Inmarsat.

Check by observation of the equipment that facilities exist to remotely program the equipment to transmit LRIT information at 6 h intervals.

Check by observation of the equipment that there is no control external to the equipment to set up or remove DNIDs. Check by inspection of the manufacturer's documentation that non-volatile memory is provided in the equipment to store 64 DNIDs with associated configuration information.

Check by observation that there are facilities to stop the transmission of LRIT information, to increase the intervals between transmissions to 24 h and to re-enable the transmissions at 6 h intervals. Confirm by observation that the operation of the facilities is protected from unauthorised access such as by a password or a key-lock.

Check by inspection of the manufacturer's documentation that facilities exist to remotely configure the equipment to transmit LRIT information at intervals ranging from 15 min to 6 h, and to stop the transmission of LRIT information.

Check by inspection of the manufacturer's documentation that the equipment will transmit LRIT information following receipt of a polling command and supports polling command types 00H to 0BH.

6.7.3 Functionality

(See 4.7.3)

Check by inspection of the manufacturer's documentation that the format of the data report is a maritime position report as described in the Inmarsat-C SDM, Volume 2, Part 2, Application Note 2. Check that the "from mobile" identifier is used for the identity of the ship and that MEM code 11 is used for time of position.

Check by observing a data report that the transmitted position and date and time conform to the data provided by the source of position updating (4.3.4).

6.7.4 Communication system

(See 4.7.4)

For this test a simulator of the LRIT system is required or the international LRIT system may be used.

Instruct the equipment

- to transmit to a LRIT data centre. Confirm that the equipment transmits the LRIT data at intervals of 6 h;
- to transmit LRIT information at 15 min intervals. Confirm that the equipment transmits at 15 min intervals;
- to transmit LRIT information at 60 min intervals. Confirm that the equipment transmits at 60 min intervals;
- with a polling command. Confirm that the equipment transmits the LRIT information within 8 min of receiving the polling command;
- to stop the transmission of LRIT information. Confirm that no information is transmitted within a 90 min period.

Use the facilities locally provided on the equipment:

– to stop the transmission of LRIT information. Confirm that no information is transmitted within a 90 min period;

– to increase the intervals between transmissions to 24 h. Confirm that transmissions are made at 24 h intervals;

– to reset the intervals between transmissions to 6 h. Confirm that transmissions are made at 6 h intervals.

Using a simulator or the LRIT system, cause the equipment to change Ocean Region or satellite. Confirm that the equipment continues to transmit LRIT information after the change of Ocean Region.

Remove the source of power from the equipment for 24 h. Confirm that the equipment automatically resumes the transmission of LRIT information when the power is restored.

NOTE This test ~~may~~ can be combined with an IMO conformance test as described in IMO Circular MSC.1/Circ.1307.

6.8 Tests of technical characteristics

6.8.1 Inmarsat tests

(See 5.1)

The tests in the Inmarsat Recommended Test Procedures (RTP) corresponding to the technical requirements in the Inmarsat System Definition Manual (SDM) are summarised in Annex C.

There are two series of tests. Phase I tests use a simulator to generate suitable signals as produced by an Inmarsat network coordination station and a land earth station together with a simulator to produce the characteristics of the radio transmission channel. Phase II tests are conducted by operating the equipment in the Inmarsat system.

6.8.2 Tests for environmental and electromagnetic compatibility

(See 5.2)

The tests for environmental and electromagnetic compatibility are given in IEC 60945:2002, Clause 8, Clause 9 and Clause 10.

For the purposes of IEC 60945, the term "performance test" is defined as a measurement of transmitter power output and frequency response and a measurement of receiver noise temperature and tuning to Inmarsat standards.

Also for the purposes of IEC 60945, "performance check" is defined as the successful transmission of a distress alert, distress priority message and reception of maritime safety information.

6.8.3 Interfaces

(See 5.4)

Check by inspection of the equipment and the manufacturer's documentation that an interface according to IEC 61162-1 is provided.

Check by using a simulator or the international SafetyNET system that sentences SM1, SM2, SM3, SM4 and SMB are transmitted as appropriate on receipt of a SafetyNET message.

Check by analytical evaluation of the equipment or inspection of the manufacturer's documentation that it complies with the requirements for an alert source in the BAM concept according to IEC 62923-1 and IEC 62923-2.

Check by observation of the equipment that a warning is transmitted with the correct category, alert identifier and alert title and descriptive text on receipt of an EGC message with priority distress or urgency.

Check by observation of the equipment that the warning is repeated as a warning after a limited time period not exceeding 5 min and that the warning is not changed to alarm priority when the warning has not been acknowledged.

Check that it is not possible to remotely acknowledge the warning.

Check that when manually reset (see 4.4.4) the warning is acknowledged.

6.8.4 Interfering signals

(See 5.5)

The operation of the equipment is checked by Inmarsat testing particularly Inmarsat test items: 2-A (noise temperature), 2-B (G/T calculations), 2-D (selectivity), 4-A (packet error rate), 4-B (carrier and frame acquisition), 6-B (TDMA synchronisation) and S8-B (distress alert activation). **11**

The interfering signal characteristics are 3GPP LTE.

NOTE This testing is described in the Inmarsat C System definition manual (SDM) Change Notice CN150.

Annex A
(normative)

Requirements relating to installation

A.1 General

Annex A reproduces those requirements relating to installation as extracted from IMO Resolutions ~~A.807(19),~~ MSC.263(84), MSC.306(87) and MSC.513(105).

A.2 Source of electrical energy

~~*(A.807(19)*~~*(MSC.513(105) A5.1 and MSC.306(87) A4.1) The ship earth station and the enhanced group call equipment* shall *normally be powered from the ship's main source of electrical energy. In addition, it* shall *be possible to operate the ship earth station, the enhanced group call equipment and all other equipment necessary for its normal functioning, including the antenna tracking system, where provided, from an alternative source of energy.*

(MSC.263(84) A4.1.5) The LRIT system shall *be supplied with energy from the main and emergency source of electrical power.*

A.3 Siting of antennas

~~*(A.807(19)*~~*(MSC.513(105) A6.1 and MSC.306(87) A5.1 and 5.3) Where an omnidirectional antenna is used it* shall*, if practicable, be sited in such a position that no obstacle likely to degrade significantly the performance of the equipment appears in the fore and aft directions down to -5° and in the port and starboard directions down to −15°. For omnidirectional antennas, objects, especially those within 1 m of the antenna, which cause a shadow sector of more than 2°, are likely to degrade significantly the performance of the equipment.*

~~*(A.807(19)*~~*(MSC.513(105) A6.2 and MSC.306(87) A5.2 and 5.4) Where a stabilized directive antenna is used it* shall*, if practicable, be sited in such a position that no obstacle, likely to degrade significantly the performance of the equipment, appears in any azimuth down to -5°. For directive antennas with a gain of approximately 20 dB, objects, especially those within 10 m of the antenna, which cause a shadow sector of greater than 6°, are likely to degrade significantly the performance of the equipment.*

A.4 Long-range identification and tracking

(MSC.263(84) A4.4) The shipborne equipment shall *be set to automatically transmit the ship's LRIT information at 6-hour intervals to the LRIT Data Centre identified by the Administration, unless the LRIT Data User requesting the provision of LRIT information specifies a more frequent transmission interval.*

A.5 Requirements

It shall be confirmed that the equipment installation handbook contains ~~appropriate~~ installation information.

Annex B
(normative)

Radiated unwanted emissions

B.1 Unwanted emissions 30 MHz to 1 000 MHz

The unwanted emissions over the frequency range 30 MHz to 1 000 MHz shall not exceed the limits in Table B.1 at a measuring distance of 10 m.

Table B.1 – Limits of unwanted emissions up to 1 000 MHz

Frequency MHz	**Quasi-peak limits** dB(µV/m)
30 to 230	30
230 to 1 000	37
The lower limit should apply at the transition frequency.	

B.2 Unwanted emissions above 1 000 MHz

The unwanted emissions equivalent isotropically radiated power (EIRP) above 1 000 MHz and outside the bands 1 626,5 MHz to 1 645,5 MHz and 1 656,6 MHz to 1 660,5 MHz, in the measurement bandwidth and in all directions shall not exceed the limits of Table B.2.

Table B.2 – Limits of unwanted emissions above 1 000 MHz

Frequency range [a]	Carrier-on [b]		Carrier-off [c]	
	EIRP limit	Measurement bandwidth	EIRP limit	Measurement bandwidth
MHz	dBpW	kHz	dBpW	kHz
1 000 to 1 525	49	100	48	100
1 525 to 1 559	49	100	17	3
1 559,0 to 1 580,42	50	1 000	50	1 000
1 580,42 to 1 605,0	50	1 000	50	1 000
1 605,0 to 1 610,0	[d]	100	[e]	100
1 610,0 to 1 626,0	74	100	48	100
1 626 to 1 626,5	84	3	48	100
1 645,5 to 1 645,6	104	3	57	3
1 645,6 to 1 646,1	84	3	57	3
1 646,1 to 1 655,9	74	3	57	3
1 655,9 to 1 656,4	84	3	57	3
1 656,4 to 1 656,5	104	3	57	3
1 660,5 to 1 661	84	3	48	100
1 661 to 1 690	74	100	48	100
1 690 to 3 400	49 [f]	100	48	100
3 400 to 10 700	55 [g]	100	48	100
10 700 to 21 200	61	100	54	100
21 200 to 40 000	67	100	60	100

[a] The lower limits should apply at the transition frequencies.

[b] Carrier-on is defined as the state when the ship earth station is authorised by the Network Coordination Station to transmit and when it transmits a signal.

[c] Carrier-off is defined as the state when the ship earth station is either authorised by the Network Coordination Station to transmit but when it does not transmit any signal, or when it is not authorised by the Network Coordination Station to transmit.

[d] Linearly interpolated from 40 dBpW in 100 kHz at 1 605,0 MHz to 74 dBpW in 100 kHz at 1 610,0 MHz.

[e] Linearly interpolated from 40 dBpW in 100 kHz at 1 605,0 MHz to 74 dBpW in 100 kHz at 1 610,0 MHz.

[f] In the band 3 253,0 MHz to 3 321,0 MHz the maximum EIRP in one, and only one, 100 kHz measurement bandwidth should not exceed 82 dBpW. Elsewhere in this band the power limit in this table should be applied.

[g] In each of the bands 4 879,5 MHz to 4 981,5 MHz, 6 506,0 MHz to 6 642,0 MHz and 8 132,5 MHz to 8 302,5 MHz the maximum EIRP in one, and only one, 100 kHz measurement bandwidth should not exceed 72 dBpW. In the band 9 759,0 MHz to 9 963,0 MHz the maximum power in one, and only one, 100 kHz measurement bandwidth should not exceed 61 dBpW. Elsewhere in these bands the power limit in Table B.2 should be applied.

B.3 Unwanted emissions within the bands with carrier-on

The EIRP of the unwanted emissions in any 3 kHz bandwidth within the bands 1 626,5 MHz to 1 645,5 MHz and 1 656,5 MHz to 1 660,5 MHz shall not exceed the limits in Table B.3.

Table B.3 – Limits of unwanted emission within the operating band with carrier-on

Offset from the edge of the band of the nominated bandwidth kHz	**Maximum EIRP** dBpW
0	117
100	104
200	84
greater than 700	74
NOTE ~~1~~ Carrier-on is defined as the state when the ship earth station is authorised by the Network Coordination Station to transmit and when it transmits a signal. ~~NOTE 2~~ Nominated bandwidth is the bandwidth of the ship earth station radio frequency transmission nominated by the manufacturer. The nominated bandwidth is wide enough to encompass all spectral elements of the transmission which have a level greater than the specified unwanted emissions limits. The nominated bandwidth is wide enough to take account of the transmit carrier frequency stability. The nominated bandwidth is within the transmit frequency band within which the ship earth station operates.	

B.4 Unwanted emissions within the bands with carrier-off

The EIRP spectral density of any emission within the bands 1 626,5 MHz to 1 645,5 MHz and 1 656,5 MHz to 1 660,5 MHz shall not exceed 57 dBpW in any 3 kHz band.

NOTE Carrier-off is defined as the state when the ship earth station is either authorised by the Network Coordination Station to transmit but when it does not transmit any signal, or when it is not authorised by the Network Coordination Station to transmit.

Annex C
(informative)

Inmarsat RTP schedule of tests

Table C.1, Table C.2 and Table C.3 describe the Inmarsat recommended test procedures (RTP) schedule of tests.

Table C.1 – Phase I Inmarsat-C schedule of tests

Inmarsat RTP Table							
Item test designation		**A**	**T**	**H**	**P**	**V**	**Inmarsat SDM Volume 3, Part 2, Chapter 2**
1	**Antenna**						
1-A	Gain profile	X					3.2.1, 3.3.1, 3.4.1
1-B	Polarization and axial ratio	X					3.2.2, 3.2.3
2	**Receiving system**						
2-A	Noise temperature	X					3.3.1
2-B	G/T calculations						3.3.1
2-C	Tuning	X	X				3.3.4, 6.3.1
2-D	Selectivity	X	X	X			4.3
3	**Transmitting system**						
3-A	Output power and frequency response	X	X	X	X		3.4.1, 3.4.9
3-B	EIRP calculations						3.4.1
3-C	Transmitted spectrum	X					3.4.2
3-D	Transmitter off power level	X	X	X	X		3.4.3
3-E	Spurious outputs	X	X	X		X	3.4.4[a)]
3-F	Harmonic outputs	X	X				3.4.5
3-G	Phase noise	X	X			X	3.4.6
3-H	Tuning	X	X				3.4.7
3-I	Frequency accuracy and stability	X	X	X	X		3.4.8
4	**Receiver performance**						
4-A	Packet error rate	X	X	X	X	X	3.3.3, 4.4, 4.5
4-B	Carrier and frame acquisition	X	X	X	X	X	4.4, 4.6
5	**Transmitter performance**						
5-A	Modulation characteristics	X	X		X		5.1
5-B	First-generation operation	X					5.2
S5-C	Signalling channel characteristics	X					5.3
5-D	Message channel characteristics	X					5.4
S5-G	2 digit special access code – Sig	X					
S5-H	2 digit special access code – Msg	X					

Inmarsat RTP Table							
Item test designation		**A**	**T**	**H**	**P**	**V**	**Inmarsat SDM Volume 3, Part 2, Chapter 2**
6	**Access control**						
6-A	General access control	X					6.1
6-A/1	Polling and data reporting	X					4 Chapter 3
6-B	TDMA synchronization	X	X				6.2.1
6-C	Random access	X					6.2.2
6-D	Common channel selection	X					6.3
6-E	Region registration procedures	X					6.5
6-F	Idle and busy conditions	X					6.6
7	**Message processing**						
7-A	Character codes	X					7.2
S7-B	Display devices	X	X	X	X	X	7.3 Chapter 5
7-C	Keyboard	X	X	X	X	X	7.4
S7-D	SES memory capacity	X	X		X		7.5 Chapter 5
7-E	DCE/DTE interface characteristics	X	X		X		7.6.1
7-F	Control codes	X					7.6.3
8	**Distress alerting functions** [b]						
S8-A	Distress message generator	X					8.2 Chapter 5
S8-B	Distress alert activation	X	X	X	X	X	8.3 Chapter 5
9	**Testing functions**						
9-A	Fail safe and monitoring	X	X				9.1, 9.2
S9-B	Performance verification and Commissioning	X					9.3 Chapter 5
10	**Electromagnetic compatibility**						
10-A	Mains conducted spurious emissions	X					10.2
11	**Physical characteristics**						
11-A	Vibration frequency response	X					11.2 Chapter 5
11-B	Rain test	X					11.2 Chapter 5

NOTE See Table 2 for variations of environmental conditions.

[a] Replaced by Annex B.

[b] There are 12 further tests in Annex A of the Inmarsat RTP required for distress calling, as follows.

A: normal ambient temperature (15 °C to 35 °C)

T: extreme temperature (−35 °C to +55 °C externally mounted equipment (EME), −15 °C to +55 °C internally mounted equipment (IME))

H: relative humidity (95 % at 40 °C)

P: primary power (AC frequency ±6 %, voltage ±10 %, DC voltage $\frac{+10}{-20}$ %, battery voltage $\frac{+35}{-20}$ %)

V: vibration (5 Hz to 12,5 Hz 1,6 mm, 12,5 Hz to 25 Hz 0,38 mm, 25 Hz to 50 Hz 0,1 mm, externally mounted equipment (EME) 2 Hz to 5 Hz 2,54 mm peak amplitude).

Table C.2 – Phase I EGC receiver schedule of tests

Inmarsat RTP Table							
Item test designation		**A**	**T**	**H**	**P**	**V**	**Inmarsat SDM Volume 3, Part 2, Chapter 2**
E1	**Antenna**						
1-A	Antenna gain profile	X					3.2
1-B	Polarization and axial ratio	X					3.2
E2	**Receiving system**						
2-A	Noise temperature	X					3.3
2-B	G/T calculations						3.3
E2-C	Receiver tuning	X	X				3.3
2-D	Receiver selectivity	X	X	X			4.3
E3	**Receiver performance**						
3-A[a)]	Packet error rate	X	X	X	X	X	4.5 Chapter 8
E4	**Message processing**						
4-A[a)]	Character codes	X					7.2 Chapter 8
4-B[a)]	Output devices	X	X	X	X	X	7.3 Chapter 8
4-C[a)]	Keyboard	X	X	X	X	X	7.4
E4-D	Memory capacity	X					7.5 Chapter 8
E4-E	Receiver addressing	X					7.7 Chapter 8
E4-F	Error detection	X					7.7.5 Chapter 8
E4-G	Sequence numbering handling	X					7.7.4 Chapter 8
E5	**Distress alerting functions**						
E5-A	Distress messages	X					7.7.6 Chapter 8
E6	**Electromagnetic compatibility**						
6-A[a)]	Mains conducted spurious emissions	X					10
E7	**Physical characteristics**						
7-A[a)]	Vibration frequency response	X					11 Chapter 8
7-B[a)]	Rain test	X					11 Chapter 8

NOTE See Table 2 for variations of environmental conditions.

[a)] Equivalence between test items in Table C.1 and Table C.2: 3Aa) = 4A, 4Aa) = 7A, 4Ba) = 7B, 4Ca) = 7C, 6Aa) = 10A, 7Aa) = 11A, 7Ba) = 11B

A: normal ambient temperature (15 °C to 35 °C)

T: extreme temperature (−35 °C to +55 °C externally mounted equipment (EME), −15 °C to +55 °C internally mounted equipment (IME))

H: relative humidity (95 % at 40 °C)

P: primary power (AC frequency ±6 % voltage, ±10 %, DC voltage $\frac{+10}{-20}$ %, battery voltage $\frac{+35}{-20}$ %)

V: vibration (5 Hz to 12,5 Hz 1,6 mm, 12,5 Hz to 25 Hz 0,38 mm, 25 Hz to 50 Hz 0,1 mm, externally mounted equipment (EME) 2 Hz to 5 Hz 2,54 mm peak amplitude)

Table C.3 – Phase II schedule of tests

Inmarsat RTP Table							
Item test designation		**A**	**T**	**H**	**P**	**V**	**Inmarsat SDM Volume 3, Part 2, Chapter 2**
	Basic access tests						
21-A	Ocean Region registration	X					
21-B	Performance verification	X					
	Message transfer tests						
22-A	To-mobile message transfer	X					
22-B	From-mobile message transfer						
22-C	Off-line operation	X					
22-D	Forced clearing	X					
	Distress alerting tests						
23-A	Distress alert transmission	X					
23-B	Distress priority message transfer						
	Log-in and log-out						
24-A	Log-out and log-in	X					
	Optional capability tests						
25-A	Alternate network service	X					
25-B	Alternate network service: X,400	X					

A: normal ambient temperature (15 °C to 35 °C)

T: extreme temperature (−35 °C to +55 °C externally mounted equipment (EME), −15 °C to +55 °C internally mounted equipment (IME))

H: relative humidity (95 % at 40 °C)

P: primary power (AC frequency ±6 % voltage, ±10 %, DC voltage $\frac{+10}{-20}$ %, battery voltage $\frac{+35}{-20}$ %)

V: vibration (5 Hz to 12,5 Hz 1,6 mm, 12,5 Hz to 25 Hz 0,38 mm, 25 Hz to 50 Hz 0,1 mm, externally mounted equipment (EME) 2 Hz to 5 Hz 2,54 mm peak amplitude)

Bibliography

IEC 61924-2, *Maritime navigation and radiocommunication equipment and systems – Integrated navigation systems – Part 2: Modular structure for INS – Operational and performance requirements, methods of testing and required test results*

IEC 62729, *Maritime navigation and radiocommunication equipment and systems – Shipborne equipment for long-range identification and tracking (LRIT) – Performance requirements*~~[1]~~

IEC 62940, *Maritime navigation and radiocommunication equipment and systems – Integrated communication system (ICS) – Operational and performance requirements, methods of testing and required test results*

ISO/IEC 2022, *Information technology – Character code structure and extension techniques*

ETSI 3GPP TS 36.104 version 13.2.0 Release 14 *LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception*

IMO, *International SafetyNET Manual*

IMO MSC.1/Circ.1307~~:2009~~/Rev 1:2022, *Guidance on the survey and certification of ships with the requirements to transmit LRIT information*

IMO, *NAVTEX Manual*

IMO Resolution MSC 252(83), *Performance standards for integrated navigation systems (INS)*

IMO Resolution MSC.431(98), *Amendments to the revised performance standards for enhanced group call (EGC) equipment (Resolution MSC.306(87))*

IMO Resolution A.811(19), *Performance standards for a shipborne integrated radiocommunication system (IRCS) when used in the GMDSS*

Inmarsat, *Inmarsat-C System Definition Manual*

Inmarsat, *Maritime design and installation guidelines, Annex ~~C,~~ A System ~~specific~~ guidelines for Inmarsat ~~C~~ ship earth stations*

~~ISO 2022, *Information technology – Character code structure and extension techniques*~~

Inmarsat, *Recommended test procedures (RTP) for the type approval of Inmarsat-C mobile earth stations*

ITU-R Recommendation M.540-2:1990, *Operational and technical characteristics for an automated direct-printing telegraph system for promulgation of navigational and meteorological warnings and urgent information to ships*

ITU-T Recommendation T.50, *International reference alphabet (IRA) (formerly international alphabet No. 5 or IA5)*

~~[1] To be published.~~

List of comments

1 The IMO revised the performance standards for Inmarsat-C ship earth stations in 2022. The new resolution containing the performance standards is MSC.513(105), replacing resolution A.807(19). This change in referencing therefore is made throughout this new edition.

Other than editorial changes, the technical requirements of resolution MSC.513(105) are unchanged from the previous resolution with the exception of a new requirement for operation in the presence of an interfering signal which is incorporated in this new edition. This requirement arises from the perceived difficulty of satisfactory operation of the Inmarsat-C equipment when in port where there may be mobile telephone base stations close by.

IMO had previously changed, in 2017, the requirements for the enhanced group call (EGC) part of the equipment in resolution MSC.431(98) which amended the previous resolution MSC.308(87). These changes added interfaces for alert management and the transfer of received data to other navigation displays and removed the requirement to produce a printed copy of received safety information providing there is an interface. These changes were incorporated in Amendment 1 and Amendment 2 to the previous edition of this standard. This edition therefore includes the referencing to resolution MSC.431(98) and the changes introduced by the amendments.

2 This new Clause 3 has been added in conformity with current drafting rules. The layout of the remaining document is unchanged except for the updating of the clause numbering.

3 This is an editorial re-arrangement of the text reflecting the new resolution MSC.513(105).

4 This new subclause has been added to give a better cross reference to Annex A which previously had only been referenced in the Scope.

5 These changes are consequential to the IMO revision of SOLAS IV adopted in 2022.

6 The extra definition of the distress button has been brought forward from an IMO Circular. The text is long established and has previously been included in IEC 60945.

7 This is a largely editorial re-arrangement of the text to reflect resolution MSC.513(105).

8 The wording for the ALF sentence has been modified to enable it to be sent with a single sentence.

9 This is the new requirement for interfering signals.

10 The test has been modified to conform to the requirements given in Subclause 4.3.4.

11 This is the new test for interfering signals.

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INTERNATIONAL STANDARD

Global maritime distress and safety system (GMDSS) –
Part 4: Inmarsat-C ship earth station and Inmarsat enhanced group call (EGC) equipment – Operational and performance requirements, methods of testing and required test results

IEC 61097-4:2024-02(en)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS) –

Part 4: Inmarsat-C ship earth station and Inmarsat enhanced group call (EGC) equipment – Operational and performance requirements, methods of testing and required test results

FOREWORD

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IEC 61097-4 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2012, Amendment 1:2016 and Amendment 2:2019. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) the addition of a technical requirement in 5.5 for operation in the presence of an interfering signal, with associated test, resulting from new IMO performance standards given in resolution MSC.513(105).

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

Draft	Report on voting
80/1102/FDIS	80/1113/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 61097 series, published under the general title *Global maritime distress and safety system (GMDSS)*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS) –

Part 4: Inmarsat-C ship earth station and Inmarsat enhanced group call (EGC) equipment – Operational and performance requirements, methods of testing and required test results

1 Scope

This part of IEC 61097 specifies the performance requirements and methods of testing for Inmarsat-C ship earth stations (SES) capable of transmitting and receiving direct-printing communications, and for enhanced group call (EGC) receivers, for use in the GMDSS and for use for long-range identification and tracking (LRIT). The available variants are:

Class 0: An EGC receiver, either stand-alone or an element of a GMDSS installation in accordance with the Inmarsat design and installation guidelines (DIGs) for GMDSS installations.

Class 1: A basic SES providing shore-to-ship and ship-to-shore message transfer only.

Class 2: As class 1 but with EGC as an alternative to shore-to-ship transfer using a shared receiver.

Class 3: As class 1 but with EGC using an independent receiver.

NOTE 1 The 34th session of the IMO Sub-Committee on Radiocommunications decided that class 2 equipment would be adequate to provide sufficient availability for the reception of maritime safety information for the GMDSS.

This document complies with IMO performance requirements stated in the normative references, Inmarsat technical characteristics and test procedures, and IEC 60945 general requirements except where modifications are explicitly stated in this document. Technical characteristics essential to GMDSS and LRIT operation as defined by the IMO are identified.

All text of this document, whose wording is identical to that in IMO SOLAS Convention 1974 as amended in 1988 and Resolutions MSC.513(105), MSC.263(84) and MSC.306(87) is printed in *italics* and reference made to the Resolution/Recommendation and subclause number.

This document covers equipment construction and testing. Matters relating to installation can be found in the Inmarsat Maritime design and installation guidelines (see Bibliography). Those to be found in IMO Resolutions MSC.513(105), MSC.263(84) and MSC.306(87) are reproduced in Annex A.

Responsibility for type approval of Inmarsat-C and Inmarsat-EGC is vested in Inmarsat by IMO Resolutions MSC.513(105) and MSC.306(87) (see 4.2.1). Therefore, this document does not reproduce Inmarsat test procedures in full but refers to where they are given in Inmarsat documentation cited in the normative references to this document (Annex C).

NOTE 2 For the purposes of this document the terms Inmarsat C, Inmarsat-C, Inmarsat Standard-C, Standard-C refer to the same equipment.

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 60945:2002, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

IEC 61108 (all parts), *Maritime navigation and radiocommunication equipment and systems – Global navigation satellite systems (GNSS)*

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

IEC 62923-1, *Maritime navigation and radiocommunication equipment and systems – Bridge alert management – Part 1: Operational and performance requirements, methods of testing and required test results*

IEC 62923-2, *Maritime navigation and radiocommunication equipment and systems – Bridge alert management – Part 2: Alert and cluster identifiers and other additional features*

IMO, *International Convention for the safety of life at sea (SOLAS),1974 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 MSC.263(84):2008, *Revised performance standards and functional requirements for the long-range identification and tracking of ships.*

IMO Resolution MSC.302(87):2010, *Performance standards for bridge alert management*

IMO Resolution MSC.306(87):2010, *Revised performance standards for enhanced group call (EGC) equipment as amended by resolution MSC.431(98):2017*

IMO Resolution MSC.513(105), *Performance standards for INMARSAT-C ship earth stations capable of transmitting and receiving direct-printing communications*

Inmarsat, *Inmarsat C System definition manual (SDM) Volume 2 – Part 2, Application Note 2, Position reporting service*

Inmarsat, *Inmarsat C System definition manual (SDM) Volume 2 – Part 2, Application Note 3, Application developers guide to data reporting and polling*

Inmarsat, *Inmarsat C System definition manual (SDM) Volume 3 – Part 2, Chapter 2, Mobile earth station technical requirements*

Inmarsat, *Inmarsat C System definition manual (SDM) Volume 3 – Part 2, Chapter 5, Ship earth station technical requirements*

Inmarsat, *Inmarsat C System definition manual (SDM) Volume 3 – Part 2, Chapter 8, Technical requirements for an EGC receiver*

Inmarsat, *Inmarsat C System definition manual (SDM) Change Notice CN150, ATCt signals and other adjacent interferers*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

4 Performance requirements

4.1 Overview

Subclauses 4.2 through 4.4 of this document describe performance requirements directly attributable to IMO Resolutions MSC.306(87) as amended by MSC.431(98) and MSC.513(105) as listed in the normative references. Subclause 4.5 is provided to highlight those requirements of IMO Resolution A.694(17) which are not included in the normal Inmarsat requirements for Inmarsat-C SES type approval. Subclause 4.6 describes other requirements which are required to make the equipment suitable for GMDSS applications. Subclause 4.7 describes performance requirements attributable to IMO Resolution MSC.263(84) for long-range identification and tracking.

4.2 Non-operational requirements

4.2.1 General

(MSC.306(87) A1.1) The enhanced group call equipment to be used in the GMDSS shall *comply with the general requirements set out in Assembly resolution A.694(17)* as detailed in IEC 60945 and this document.

(MSC.513(105) A1.1) The Inmarsat-C ship earth station installation provided to meet a requirement for a ship earth station in SOLAS regulations IV/8.1.4, 9.1.3.3, 9.4.2, 10.1.1 or 10.1.4.3 shall *comply with the general requirements set out in resolutions A.694(17). It should be capable of transmitting and receiving automated telegraphy communications in compliance with the relevant ITU-R recommendation on direct-printing telegraphy. In addition, the Inmarsat-C ship earth station* shall *conform to the following minimum requirements.*

(MSC.513(105) A1.2) The performance of any enhanced group call facility provided by the ship earth station shall *be in accordance with the performance standards for enhanced group call equipment set out in resolution MSC.306(87) as amended by resolution MSC.431(98) and with the following minimum performance requirements.*

(MSC.513(105) A2.1)/MSC.306(87) 2) The ship earth station and the EGC equipment shall *be type-approved by Inmarsat and* shall *comply with the environmental conditions and electromagnetic compatibility requirements specified in IEC 60945.*

4.2.2 Warning of radiation hazard

(MSC.513(105) A4) In order to permit a warning of potential radiation hazards to be displayed in appropriate locations, a label shall *be attached to the radome indicating the distances external to the radome at which radiation levels of 100 W/m^2, 25 W/m^2 and 10 W/m^2 exist. However, the distances which are within the radome need not be indicated.*

NOTE Owing to the low transmitted power of Inmarsat-C transmitters (less than 16 dBW) and the omnidirectional antenna used, this label is not normally required.

4.2.3 Power supply changeover

(See 6.2)

(MSC.513(105) A5.2/MSC.306(87) A4.2) Changing from one source of supply to another or any interruption of up to 60 s duration of the supply of electrical energy shall *not require the equipment to be manually re-initialized and* shall *not result in loss of received messages stored in the memory.*

4.2.4 Installation

Requirements for installation of the equipment are given in Annex A.

4.3 Operational requirements for ship earth stations

4.3.1 Capabilities

(See 6.3.1)

The equipment shall comply with regulations IV/8 through IV/10 of SOLAS 1974, as amended, which prescribe the capabilities of Inmarsat ship earth stations to meet the GMDSS requirements for ships in the various sea areas. The four capabilities are:

– *(SOLAS IV/8.1.4, IV/9.1.3.3 and IV/10.1.4.3) means of initiating the transmission of ship-to-shore distress alerts.*
– *(SOLAS IV/10.1.1) transmitting and receiving distress urgency and safety communications.*
– *(SOLAS IV/10.1.2) initiating and receiving distress priority calls.*
– *(SOLAS IV/9.4.2, IV/10.4.1) transmitting and receiving general radiocommunications.*

4.3.2 Ship station identity

(See 6.3.2)

(MSC.513(105) A3.1) No control external to the equipment shall *be available for alteration of the ship station identity.*

4.3.3 Distress alerting

(See 6.3.3)

(MSC.513(105) A3.2) It shall *be possible to initiate and make distress calls from the position from which the ship is normally navigated and from at least one other position designated for distress alerting.*

(MSC.513(105) A3.3) A distress alert shall *be activated only by means of a dedicated distress button. This button* shall *not be any key of an ITU-T digital input panel or an ISO keyboard associated with the equipment and* shall *be physically separated from functional buttons/keys used for normal operation. This button* shall *be a single button for no other purpose than to initiate a distress alert.*

(MSC.513(105) A3.4) The dedicated distress button shall:

.1 be clearly identified, red in colour and marked "DISTRESS". Where a non-transparent protective lid or cover is used, it shall *also be marked "DISTRESS; and*

.2 be protected against inadvertent operation. The required protection of the distress button shall *consist of a spring-loaded lid or cover permanently attached to the equipment by, for*

example, hinges. It shall *not be necessary for the user to remove additional seals or to break the lid or cover in order to operate the distress button. The operation of the distress button* shall *generate a visible and audible indication. The distress button* shall *be kept pressed for at least three seconds. A flashing light and an intermittent acoustic signal* shall *start immediately. After the three seconds, the transmission of the distress alert is initiated and the indication* shall *become steady and the acoustic signal* shall *stop.*

(MSC.513(105) A3.5) The distress alert initiation shall *require at least two independent actions. Lifting of the protective lid or cover is considered as the first action. Pressing the distress button as specified above is considered as the second independent action.*

(MSC.513(105) A3.6) The equipment shall *indicate the status of the distress alert transmission.*

(MSC.513(105) A3.7) It shall *be possible to interrupt and initiate distress messages at any time. It* shall *be possible to interrupt repetitive transmissions of distress messages. Such operation* shall *not interrupt the transmission of a distress alert or distress message in progress but* shall *prevent repetitive transmissions of a distress message.*

It shall be possible to select the content of, but not initiate a distress alert using the equipment keyboard or other means, before depressing one of the dedicated buttons to initiate the distress alert. It shall also be possible to activate an undesignated (see Note) distress alert by depressing one of the buttons, at any time.

NOTE Undesignated – unspecified distress alert, i.e. the default setting. All other selectable alerts are "designated".

4.3.4 Position updating

(See 6.3.4)

(MSC.513(105) A3.8) To enable updating of the position:

.1 the status of the position update shall *be visible to the operator (e.g. offline, manual or automatic);*

.2 if position data is being updated automatically, a caution shall *be raised if no update has been performed for a period of 10 minutes. The caution* shall *be removed by receiving new position data;*

.3 if an integral electronic position-fixing aid is not provided, the equipment shall *have an interface conforming to the appropriate international standard;*

.4 the equipment shall *have facilities for manually entering the ship's position and the time of the position fix;*

.5 if the ship's manually-set position is older than four hours, a caution shall *be raised. The caution* shall *be removed by inputting or receiving new position data; and*

.6 if the ship's position is older than 24 hours, the position is clearly identified with date and time of the fix in UTC for distress alerting purposes.

The integral electronic position-fixing aid shall comply with the applicable requirements of the IEC 61108 series.

As a minimum, the interface shall support the sentences GNS, RMC and ZDA described in IEC 61162-1.

NOTE Subclause 3.3.7, which is referenced in the Inmarsat-C SDM, is 4.3.3 in this edition of this document.

4.4 Operational requirements for EGC receivers

4.4.1 Capabilities

(See 6.4.1)

The equipment shall comply with regulations IV/7 and IV/10 of SOLAS 1974, as amended, which prescribe the capabilities of EGC receivers to meet the GMDSS requirements for ships in the various sea areas. The two capabilities are:

– *(SOLAS IV/7.1.4) a radio facility for reception of maritime safety information by the Inmarsat enhanced group calling system.*
– *(SOLAS IV/10.1.1.3) an Inmarsat ship earth station capable of maintaining watch for shore-to-ship distress alerts, including those directed to specifically defined geographical areas.*

4.4.2 General

(See 6.4.2)

(MSC.306(87) A1.3 as amended by resolution MSC.431(98)) Alternatively to the requirement in paragraph MSC.306(87) A1.2, the equipment need not provide means to produce a printed copy of received information if it is installed in combination with an interface connecting it to navigation equipment that is compliant with resolution MSC 252(83), as amended, on Revised Performance standards for integrated navigation systems (INS). Provisions for interconnection to a shipborne integrated radiocommunication system (IRCS) when used in the GMDSS (resolution A.811(19)) shall *also be included.*

If no means are provided by the equipment to produce a printed copy of received information then the manufacturer's documentation shall clearly describe that the equipment can only be used when connected to equipment enabled for the display of enhanced group calls as described in IEC 61924-2.

(MSC.306(87) A1.4) The enhanced group call installation may be either separate or combined with other installations. Elements of other installations, e.g. the antenna, low noise amplifier and down converter of the ship earth system, may be shared for the reception of enhanced group call messages.

4.4.3 Position and area code updating

(See 6.4.3)

(MSC.306(87) A3.1) The equipment shall *provide a visual indication that the ship's position has not been updated during the last 12 hours. It* shall *only be possible to reset this indication by revalidating the ship's position.* See also 4.3.4.

(MSC.306(87) A3.2) Means shall *be provided to enter the ship's position and current and planned NAVAREA/METAREA codes manually so that area group calls can be received. Means shall also be provided to enter current and planned coastal warning service coverage areas and different classes of messages. Optionally, the ship's position, as determined by the navigational equipment may be entered automatically and the NAVAREA/METAREA code automatically derived therefrom.*

NOTE NAVAREAs and METAREAs are geographical sea areas established for the purpose of co-ordinating the broadcast of navigational and meteorological safety information. The world is currently divided into 21 areas (I to XXI). The boundaries are shown in the IMO International SafetyNET Manual.

4.4.4 Indication of receipt of priority message

(See 6.4.4)

(MSC.306(87) A3.3) Provision shall *be made for a specific aural alarm and visual indication at the position from which the ship is normally navigated to indicate receipt of a distress or urgency priority EGC message. It* shall *not be possible to disable this alarm and it* shall *only be possible to reset it manually and only from the position where the message is displayed or printed.*

4.4.5 Indication of tuning and synchronisation

(See 6.4.5)

(MSC.306(87) A3.4) The equipment shall *indicate when it is not correctly tuned or synchronized to the enhanced group call carrier.*

4.4.6 Printing selection

(See 6.4.6)

(MSC.306(87) A3.5) Any message shall *be printed regardless of the character error rate of its reception. The equipment* shall *print a low-line mark if a character is received corrupted.*

(MSC.306(87) A3.6) Acceptance or rejection of service codes shall *be under the operator's control except that equipment* shall *always receive navigational and meteorological warnings and forecasts, search and rescue information, and shore-to-ship distress alerts, which are directed to a fixed or absolute geographical area in which the ship is operating.*

NOTE The service codes (C_2) are described in the IMO International SafetyNET Manual. They have similar meanings as the subject indicator characters (B_2) in the NAVTEX system described in the IMO NAVTEX Manual and Recommendation ITU-R M.540.

(MSC.306(87) A3.7) Means shall *be provided to prevent the reprinting of a message once it has been received without error.*

4.4.7 Printing device

(See 6.4.7)

(MSC.306(87) A3.8) The printing device shall *be capable of printing at least the standard International Alphabet Number 5 (IA5) character set. Other character sets are optionally used according to ISO 2022 standards.*

(MSC.306(87) A3.9) The printing device shall *be able to print at least 40 characters per line.*

(MSC.306(87) A3.10) The signal processor and printing device shall ensure that if a word cannot be accommodated in full on one line, it shall *be transferred to the next line. The printing device* shall *automatically feed five lines after completing the printed messages.*

(MSC.306(87) A3.11) A local audible alarm shall *be sounded to give advanced warning of the printing device "paper low" condition. It* shall *not be possible to confuse the sound of the "paper low" alarm with that of the distress or urgency alarm caused by the reception of a distress or urgency priority message.*

4.5 Performance related requirements from IEC 60945

(See 6.5)

The equipment shall comply with those subclauses of IEC 60945 appropriate to its equipment class. The subclauses of IEC 60945:2002 referenced below, amend or augment the corresponding requirements of the Inmarsat-C SDM.

– 4.1 *General*
– 4.2 *Design and operation*
– 4.3 *Power supply*
– 4.4 *Durability and resistance to environmental conditions* (see 4.2)

– 4.5 *Interference* (see 4.2)
– 4.6 *Safety precautions*
– 4.7 *Maintenance*
– 4.8 *Equipment manuals*
– 4.9 *Marking and identification*

4.6 Other requirements

(See 6.6)

Message display facilities shall be suitable for displaying received distress-related messages. It is recommended that the display facilities should comply with the corresponding requirements for EGC receivers in 4.4.6 and 4.4.7.

Any programming material or software that forms part of the equipment and which is necessary for meeting the GMDSS requirements shall be permanently installed in the equipment. Any software needed to fulfil any distress and safety requirements of the GMDSS shall not be stored on any medium which can be accessed, modified or corrupted.

Any ancillaries associated with Inmarsat-C equipment, such as visual display units, keyboards and printers, shall be available immediately on demand to service GMDSS functional requirements. These ancillaries shall also be provided with fixing arrangements to prevent unauthorized removal or disconnection.

4.7 Long-range identification and tracking

4.7.1 General

(See 6.7.1)

Long-range identification and tracking of ships (LRIT) is a requirement of regulation V/19-1 of SOLAS 1974 as amended.

NOTE 1 IEC 62729 contains general information on LRIT.

For the purposes of LRIT the Inmarsat-C SES shall support the Inmarsat enhanced pre-assigned data reporting service (reserved access), the enhanced data reporting service (unreserved access), and the polling service.

NOTE 2 Enhanced and enhanced pre-assigned data reporting offers additional capabilities and features over the Inmarsat data reporting service particularly; use of an internal data reporting checksum, inclusion of the ship earth station identification to ensure unambiguous identification of stations, an acknowledgement mechanism managing multiple assignments inside the Ocean Region and across Ocean Regions, changing reporting intervals, controlling and querying assignments and status request facility to ensure reliable transfer.

4.7.2 Capabilities

4.7.2.1 Transmission of information

(See 6.7.2)

(MSC.263(84) A4.1.1) Shipborne equipment shall *be capable of automatically and without human intervention on board the ship transmitting the ship's LRIT information at 6-hour intervals to an LRIT Data Centre.*

(MSC.263(84) A4.4.1) When a ship is undergoing repairs, modifications or conversions in dry-dock or in port or is laid up for a long period, the master or the Administration may reduce the frequency of the transmission LRIT information to one transmission every 24-hour period or may temporarily stop the transmission of such information.

NOTE LRIT data centres are set up by governments, either individually or in cooperation with other governments. Administrations decide to which LRIT data centre ships entitled to fly their flag are required to transmit the LRIT information. The LRIT information is described in Table 1.

This requirement is achieved by the reserved data reporting service using a data network identity (DNID) and a member number to associate the LRIT information with an LRIT data centre. Information about the DNID and member number is downloaded by polling commands (see 4.7.2.2) under the control of an Administration.

There shall be no control external to the equipment to set up or remove DNIDs. However, facilities shall be provided to stop the transmission of LRIT information and to increase the intervals between transmissions to 24 h, by controls external to the equipment. Facilities shall also be provided to re-enable the transmissions at 6 h intervals. These facilities shall be security protected so that access can be restricted to the master only.

4.7.2.2 Remote configuration

(MSC.263(84) A4.1.2) Shipborne equipment shall *be capable of being configured remotely to transmit LRIT information at variable intervals (Pre-scheduled position reports).*

The equipment shall be capable of being remotely configured to transmit LRIT information at intervals ranging from a minimum of 15 min to periods of 6 h to the LRIT data centre, irrespective of where the ship is located and without human interaction on board the ship.

The equipment shall also be capable of being remotely configured to stop the transmission of LRIT information.

This requirement is achieved by the polling service and by using control/query commands supported by the enhanced pre-assigned data reporting service. The equipment shall support polling command types 00H to 0BH as described in the Inmarsat-C SDM Volume 2, Part 2, Application Note 3.

Configuration information, as described in the Inmarsat-C SDM Volume 2, Part 2, Application Note 3 shall be stored in non-volatile memory to allow recovery after a power outage. There shall be provision within the non-volatile memory to store at least 64 16-bit DNIDs.

4.7.2.3 On-demand reports

(MSC.263(84) A4.1.3) Shipborne equipment shall *be capable of transmitting LRIT information following receipt of polling commands (On-demand position reports).*

NOTE 1 On-demand position reports means transmission of LRIT information as a result of either receipt of polling command or of remote configuration of the equipment so as to transmit at intervals other than the preset ones.

The equipment shall be capable of responding to a request to transmit LRIT information on demand without human interaction on board the ship, irrespective of where the ship is located.

This requirement is achieved by the polling and data reporting service.

The equipment shall transmit the LRIT information within 8 min of receiving the polling command.

NOTE 2 The worst-case signalling exchange for a polling command takes 44 frames plus 1 min (7,3 min). MSC.263(84) A13 describes that on-demand information be provided to an LRIT data user within 30 min of the time that the LRIT data user requested the information.

4.7.3 Functionality

(See 6.7.3)

(MSC.263(84) A4.2) In addition to the provisions specified in 4.7.2, the shipborne equipment shall *provide the functionality specified in* Table 1.

Table 1 – Data to be transmitted from the shipborne equipment

Parameter	Comments
Identity of the ship	The identifier used by the shipborne equipment.
Position of the ship (latitude and longitude)	The Global Navigation Satellite System (GNSS) position (latitude and longitude) of the ship (based on the WGS 84 datum).
Date and time of the position provided	The date and time, indicated as Universal Coordinated Time (UTC), associated with the GNSS position. In the LRIT system this is known as Time Stamp 1. The equipment should be capable of transmitting the time associated with the GNSS position with each transmission of LRIT information.
NOTE The format of the data report is described in the Inmarsat-C SDM Volume 2, Part 2, Application Note 2. The enhanced data reporting protocol permits the 24-bit codes allocated to the ship earth station as "to-mobile" and "from-mobile" identifiers to be included, together with the 8-bit code identifier for the land earth station used. The category of the report is 01B (maritime position report). The latitude and longitude of the position is coded to an accuracy of 0,04 of a minute. The Macro Encoded Message (MEM code) is set to 11 (time of position). The date is coded as current or next month and day. The time is coded as hour and minutes to an accuracy of 2 min.	

4.7.4 Communication system

(See 6.7.4)

(MSC.263(84) A4.3) The shipborne equipment shall *transmit the LRIT information using a communication system which provides coverage in all areas where the ship operates.*

The Inmarsat-C shipborne equipment operates in the coverage area defined by Inmarsat which comprises the Pacific Ocean Region, Atlantic Ocean Region-West, Atlantic Ocean Region-East and Indian Ocean Region.

NOTE Each 16-bit data network identity (DNID) is associated with the 8-bit code of a land earth station (LES). In order for equipment to continue transmitting after a change of Ocean Region the equipment stores DNID/LES pairs of codes relevant to all Ocean Regions.

5 Technical characteristics

5.1 Overview

(See 6.8.1)

IMO Resolutions MSC.513(105) and MSC.306(87) appoint Inmarsat as the type approval authority for Inmarsat-C SES and Inmarsat-EGC (see 4.2.1). The Inmarsat-C SDM is, therefore, the primary source of technical characteristics for Inmarsat-C SES and EGC receivers for use in the GMDSS, but the amendments and additions given in 5.2 to 5.5 shall apply.

5.2 Environmental and electromagnetic compatibility requirement

(See 6.8.2)

Models of Inmarsat-C SESs and EGC receivers which are to be submitted for type approval for GMDSS use within the Inmarsat system shall be designed so as to operate over the following range of environmental conditions, which are consistent with the requirements as indicated of:

a) Inmarsat-C SDM, Volume 3, Part 2, Chapter 5 + Chapter 5, Annex A (referred to below as "Inmarsat"); or,

b) Inmarsat modified by IEC 60945 using the most stringent combined set of conditions; or,

c) IEC 60945.

Table 2 provides a summary of the Inmarsat environmental requirements as modified by IEC 60945. Annex C describes the tests to which the various environmental conditions are applied.

Table 2 – Environmental conditions

	Condition	Comment
a)	Ambient temperature	"Inmarsat" modified by 8.2 and 8.4 of IEC 60945:2002
b)	Relative humidity	"Inmarsat" modified by 8.3 of IEC 60945:2002
c)	Spray	"Inmarsat" modified by 8.8 of IEC 60945:2002
d)	Ice	"Inmarsat"
e)	Precipitation	"Inmarsat" modified by 8.8 of IEC 60945:2002
f)	Wind	"Inmarsat"
g)	Solar radiation	"Inmarsat"
h)	Prime power variations AC mains supply DC mains supply Battery supply	 "Inmarsat" "Inmarsat" "Inmarsat" modified by 4.3.2 of IEC 60945:2002
j)	Vibration	"Inmarsat" modified by 8.7 of IEC 60945:2002
k)	Antenna inclinations	"Inmarsat"
l)	Induced acceleration	"Inmarsat"
m)	Velocity	"Inmarsat"
	Corrosion	8.12 of IEC 60945:2002
NOTE The letters a) to m) directly mirror the lettering used in the Inmarsat-C SDM, Volume 3, Part 2, Chapter 5, section 11.2.		

All Inmarsat-C equipment covered by this document shall comply with the electromagnetic compatibility requirements detailed in the tests in IEC 60945:2002, Clause 9 and Clause 10.

5.3 Radiated spurious emissions

The radiated spurious emissions requirement is described in Annex B.

5.4 Interfaces

(See 6.8.3)

(MSC.306(87) A6.3 as amended by resolution MSC.431(98)) All interfaces provided for communication with other navigation or communication equipment shall *comply with* IEC 61162-1.

(MSC.306(87) A6.1 as amended by resolution MSC.431(98)) The equipment shall *include at least one interface for the transfer of received data to other navigation display or integrated communications equipment.*

The equipment shall be provided with a data interface capable of transmitting the sentences SM1, SM2, SM3, SM4 and SMB according to IEC 61162-1.

(MSC.306(87) A6.2 as amended by resolution MSC.431(98)) The equipment shall *include an interface for alert management in accordance with resolution MSC.302(87) on Performance standards for bridge alert management.*

In addition to the sentences previously mentioned, the equipment shall be capable of communicating with the sentences ACN, ALC, ALF, ARC and HBT according to IEC 61162-1.

The equipment shall be capable of classifying, handling, displaying and reporting alerts as required in IEC 62923-1 and IEC 62923-2. In the BAM concept, the EGC receiver acts as an alert source.

The equipment shall be capable of releasing an alert with priority Warning and Category A with alert identifier 3122 on receipt of a distress or urgency priority EGC message.

NOTE 1 Warning is a short audible announcement repeated up to every 5 min until acknowledged by the operator, "Category A" refers to when acknowledgement is only possible at the source, "Alert identifier 3122" indicates a message received warning.

The alert title for the first ALF sentence for a distress priority EGC message (C_1 = 3) shall be "Distress RX". The additional information in the second ALF sentence shall be "Incoming distress. Check Inmarsat display".

The alert title for the first ALF sentence for an urgency priority EGC message (C_1 = 2) shall be "Urgency RX". The additional information in the second ALF sentence shall be "Incoming urgency. Check Inmarsat display".

NOTE 2 The priority codes (C_1) are described in the IMO International SafetyNET Manual.

The alert, if not acknowledged, shall be repeated as a warning after a limited time period not exceeding 5 min. Unacknowledged warnings shall not be changed to alarm priority.

5.5 Interfering signals

(See 6.8.4)

(MSC.513(105) A2.2) The Inmarsat-C receiver shall *be capable of operating in the presence of an interfering signal with the following characteristics: a wideband signal of bandwidth 5 MHz, occupying the band 1 512-1 517 MHz, at a power level of −30 dBm measured at the receiver input.*

6 Methods of testing and required test results

6.1 Overview

6.1.1 General

All tests carried out under Inmarsat control as per the applicable Inmarsat SDM will be acceptable and need not be repeated for compliance with this document.

NOTE Inmarsat test items given below relate to Inmarsat recommended test procedures (RTP) as described in Annex C. The given order of tests is logical regarding equipment build state and test location but is not critical and can be changed if required.

6.1.2 Performance requirements

The equipment shall be tested for compliance with the performance requirements described in Clause 4 using the methods prescribed in 6.2 through 6.6.

6.1.3 Technical characteristics

The equipment shall be tested for compliance with the technical characteristics listed in Clause 5 using the methods prescribed in the Inmarsat documentation, but using the environmental conditions defined in Table 2, as indicated in 6.7.

6.2 Tests of non-operational requirements

(See 4.2)

With the equipment operating normally, and with a received message stored in the equipment, the power shall be removed for a period of 60 s, and then restored. On restoration of the power the equipment shall continue to operate normally, remain logged to the previous Ocean Region, and the stored message shall contain no additional errors.

6.3 Tests of operational requirements for ship earth stations

6.3.1 Capabilities

(See 4.3.1)

Compliance with the SOLAS regulations is checked by Inmarsat testing particularly:

– Inmarsat test item S8-B (distress alert activation), for means of initiating the transmission of ship-to-shore distress alerts;

– Inmarsat test items; 7-A (character codes), S7-B (display devices), 7-C (keyboard), 22-A (to-mobile message transfer), 23-A (distress alert transmission) and 23-B (distress alert message transfer) for transmitting and receiving distress and safety communications, distress priority calls and general radiocommunications.

6.3.2 Ship station identity

(See 4.3.2)

Check by inspection of the equipment and the manufacturer's documentation that no external control is available for alteration of the ship station identity.

6.3.3 Distress alerting

(See 4.3.3)

Check by inspection of the equipment and the manufacturer's documentation that a dedicated distress button is provided which is capable of being installed at a position on a ship from which the ship is normally navigated. Check that provisions have been made for a further dedicated button for use with the equipment suitable for installation on a ship at another position.

Check that the design and operation of the distress button conforms to the requirements and tests given for distress alert in 4.3.3.

Check that it is possible to select the content of a distress alert before initiating a distress alert but check also that it is possible to initiate a distress alert without selecting any content and that in this case the alert is undesignated.

NOTE The function of the distress alert activation is checked by Inmarsat test item S8-B.

6.3.4 Position updating

(See 4.3.4)

If the equipment includes a Global Navigation Satellite System receiver, check by inspection of the manufacturer's documentation that the position accuracy (static and dynamic), speed over the ground (SOG) accuracy, course over the ground (COG) accuracy, update rate, interference susceptibility and status indication comply with the requirements of the IEC 61108 series.

If the equipment has an interface for obtaining position information check that this supports the sentences GNS, RMC and ZDA described in IEC 61162-1.

Check that facilities are provided for manual entry of position.

By inhibiting the signal from a position fixing aid (internally provided or externally provided through an interface) check that a caution is activated when no position data is received for a period of 10 min.

Check with a manual entry of position that a caution is activated after 4 h.

Check by not updating the position information in the equipment for 24 h that there is an indication that the position is over 24 h old.

NOTE See also 6.4.3 which tests for a further indication of whether the equipment includes an EGC receiver.

6.4 Tests of operational requirements for EGC receivers

6.4.1 Capabilities

(See 4.4.1)

Compliance with the SOLAS regulations is checked by the tests in 6.4.2 to 6.4.7.

6.4.2 General

(See 4.4.2)

The operation of the equipment is checked by Inmarsat testing particularly Inmarsat test items: E-4B (output devices), E-4D (memory capacity), E-4E (receiver addressing) and E-5A (distress messages).

Inspect the configuration of the receiver and note whether it is stand alone or combined with other equipment.

Inspect the configuration of the equipment and note whether it is intended to produce a printed copy of received information or be used in combination with other navigation equipment through an interface. If the equipment does not provide a printed copy of received information, check by inspection of the manufacturer's documentation that it clearly states that the equipment shall only be used when connected to an INS.

6.4.3 Position and area code updating

(See 4.4.3)

Check by not updating the position information in the equipment for 12 h that there is an indication that the position is over 12 h old. Check that this indication can only be reset by revalidating the position.