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SECRETARIAT:

United Kingdom

SECRETARY:

Mr Kim Fisher

OF INTEREST TO THE FOLLOWING COMMITTEES:

PROPOSED HORIZONTAL STANDARD:



Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

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TITLE:

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

PROPOSED STABILITY DATE: 2029

NOTE FROM TC/SC OFFICERS:

This new edition updates the text to the latest IMO performance standards given in IMO resolution MSC.513(105).

CONTENTS

1	Scope	6
2	Normative references	6
3	Terms and definitions	8
4	Performance requirements	8
4.1	Overview	8
4.2	Non-operational requirements	8
4.2.1	General	8
4.2.2	Warning of radiation hazard.....	8
4.2.3	Power supply changeover.....	9
4.3	Operational requirements for ship earth stations	9
4.3.1	Capabilities	9
4.3.2	Ship station identity	9
4.3.3	Distress alerting	9
4.3.4	Position updating.....	10
4.4	Operational requirements for EGC receivers	10
4.4.1	Capabilities	10
4.4.2	General	11
4.4.3	Position and area code updating.....	11
4.4.4	Indication of receipt of priority message	11
4.4.5	Indication of tuning and synchronisation	12
4.4.6	Printing selection.....	12
4.4.7	Printing device.....	12
4.5	Performance related requirements from IEC 60945	12
4.6	Other requirements	13
4.7	Long-range identification and tracking	13
4.7.1	General	13
4.7.2	Capabilities	13
4.7.3	Functionality.....	14
4.7.4	Communication system.....	15
5	Technical characteristics	15
5.1	Overview	15
5.2	Environmental and electromagnetic compatibility requirement.....	15
5.3	Radiated spurious emissions	16
5.4	Interfaces	16
5.5	Interfering signals.....	17
6	Methods of testing and required test results	17
6.1	Overview	17
6.1.1	General	17
6.1.2	Performance requirements	17
6.1.3	Technical characteristics	17
6.2	Tests of non-operational requirements	18
6.3	Tests of operational requirements for ship earth stations	18
6.3.1	Capabilities	18
6.3.2	Ship station identity	18
6.3.3	Distress alerting	18

6.3.4	Position updating	18
6.4	Tests of operational requirements for EGC receivers	19
6.4.1	Capabilities	19
6.4.2	General	19
6.4.3	Position and area code updating	19
6.4.4	Indication of receipt of priority message	19
6.4.5	Indication of tuning and synchronisation	19
6.4.6	Printing selection	20
6.4.7	Printing device	20
6.5	Tests of performance related requirements from IEC 60945	20
6.6	Tests of other requirements	20
6.7	Long-range identification and tracking	20
6.7.1	General	20
6.7.2	Capabilities	20
6.7.3	Functionality	21
6.7.4	Communication system	21
6.8	Tests of technical characteristics	22
6.8.1	Inmarsat tests	22
6.8.2	Tests for environmental and electromagnetic compatibility	22
6.8.3	Interfaces	22
6.8.4	Interfering signals	23
Annex A	(normative) Requirements relating to installation	24
A.1	General	24
A.2	Source of electrical energy	24
A.3	Siting of antennas	24
A.4	Long-range identification and tracking	24
A.5	Requirements	24
Annex B	(normative) Radiated unwanted emissions	25
B.1	Unwanted emissions 30 MHz to 1 000 MHz	25
B.2	Unwanted emissions above 1 000 MHz	25
B.3	Unwanted emissions within the bands with carrier-on	26
B.4	Unwanted emissions within the bands with carrier-off	27
Annex C	(informative) Inmarsat RTP schedule of tests	28
Table 1	– Data to be transmitted from the shipborne equipment	15
Table 2	– Environmental conditions	16
Table B.1	– Limits of unwanted emissions up to 1 000 MHz	25
Table B.2	– Limits of unwanted emissions above 1 000 MHz	26
Table B.3	– Limits of unwanted emission within the operating band with carrier-on	27
Table C.1	– Phase I Inmarsat-C schedule of tests	28
Table C.2	– Phase I EGC receiver schedule of tests	30
Table C.3	– Phase II schedule of tests	31

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**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 change with respect to the previous edition:

- 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
XX/XX/FDIS	XX/XX/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/standardsdev/publications.

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

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

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.

The 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 standard. 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 may also 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 3.2.1). Therefore, this standard 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 standard (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, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- 46 IEC 60945:2002, *Maritime navigation and radiocommunication equipment and systems –*
47 *General requirements – Methods of testing and required test results*
- 48 IEC 61108 (all parts), *Maritime navigation and radiocommunication equipment and systems*
49 *– Global navigation satellite systems (GNSS)*
- 50 IEC 61162-1, *Maritime navigation and radiocommunication equipment and systems – Digital*
51 *interfaces – Part 1: Single talker and multiple listeners*
- 52 IEC 62923-1, *Maritime navigation and radiocommunication equipment and systems – Bridge*
53 *alert management – Part 1: Operational and performance requirements, methods of testing*
54 *and required test results*
- 55 IEC 62923-2, *Maritime navigation and radiocommunication equipment and systems – Bridge*
56 *alert management – Part 2: Alert and cluster identifiers and other additional features*
- 57 IMO, *International Convention for the safety of life at sea (SOLAS), 1974 as amended*
- 58 IMO Resolution A.694(17):1991, *General requirements for shipborne radio equipment*
59 *forming part of the global maritime distress and safety system (GMDSS) and for electronic*
60 *navigational aids*
- 61 *IMO Resolution MSC.513(105), Performance standards for INMARSAT-C ship earth stations*
62 *capable of transmitting and receiving direct-printing communications*
- 63 IMO Resolution MSC.263(84):2008, *Revised performance standards and functional*
64 *requirements for the long-range identification and tracking of ships.*
- 65 IMO Resolution MSC.302(87) (2010), *Performance standards for bridge alert management*
- 66 IMO Resolution MSC.306(87):2010, *Revised performance standards for enhanced group call*
67 *(EGC) equipment as amended by resolution MSC.431(98)*
- 68 Inmarsat, *Inmarsat C System definition manual (SDM) Volume 2 – Part 2, Application Note*
69 *2, Position reporting service*
- 70 Inmarsat, *Inmarsat C System definition manual (SDM) Volume 2 – Part 2, Application Note*
71 *3, Application developers guide to data reporting and polling*
- 72 Inmarsat, *Inmarsat C System definition manual (SDM) Volume 3 – Part 2, Chapter 2, Mobile*
73 *earth station technical requirements*
- 74 Inmarsat, *Inmarsat C System definition manual (SDM) Volume 3 – Part 2, Chapter 5, Ship*
75 *earth station technical requirements*
- 76 Inmarsat, *Inmarsat C System definition manual (SDM) Volume 3 – Part 2, Chapter 8,*
77 *Technical requirements for an EGC receiver*
- 78 *Inmarsat, Inmarsat C System definition manual (SDM) Change Notice CN150, ATCt signals*
79 *and other adjacent interferes*
- 80 Inmarsat, *Recommended test procedures (RTP) for the type approval of Inmarsat-C mobile*
81 *earth stations*

3 Terms and definitions

No terms and definitions are listed in this document.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/ob>

4 Performance requirements

4.1 Overview

Subclauses 4.2 through 4.4 of this document describe performance requirements directly attributable to IMO Resolutions **MSC.513(105)** and MSC.306(87) 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 Inmarsat Standard-C ship earth station installation capable of transmitting and receiving direct-printing communications, and 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 IEC standard.

(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/m², 25 W/m² and 10 W/m² exist. However, the distances which are within the radome need not be indicated.

NOTE Due 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.

4.3 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 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, using either radiotelephony or direct-printing telegraphy.

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

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 standard.

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:

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

215 4.4.2 General

216 (See 6.4.2)

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

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

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

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

234 4.4.3 Position and area code updating

235 (See 6.4.3)

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

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

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

248 4.4.4 Indication of receipt of priority message

249 (See 6.4.4)

250 (MSC.306(87) A3.3): Provision shall be made for a specific aural alarm and visual indication
251 at the position from which the ship is normally navigated to indicate receipt of a distress or
252 urgency priority EGC message. It shall not be possible to disable this alarm and it shall only
253 be possible to reset it manually and only from the position where the message is displayed
254 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 (C₂) are described in the IMO International SafetyNET Manual. They have similar meanings as the subject indicator characters (B₂) 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 clauses of IEC 60945 appropriate to its equipment class. The subclauses of IEC 60945 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

- 296 – 4.7 *Maintenance*
- 297 – 4.8 *Equipment manuals*
- 298 – 4.9 *Marking and identification*

299 **4.6 Other requirements**

300 (See 6.6)

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

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

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

312 **4.7 Long-range identification and tracking**

313 **4.7.1 General**

314 (See 6.7.1)

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

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

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

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

326 **4.7.2 Capabilities**

327 **4.7.2.1 Transmission of information**

328 (See 6.7.2)

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

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

336 NOTE LRIT Data Centres are set up by Governments, either individually or in cooperation with other
337 Governments. Administrations decide to which LRIT Data Centre ships entitled to fly their flag are required to
338 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 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 an equipment to continue transmitting after a change of Ocean Region it is necessary for the equipment to have stored 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 following amendments and additions 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 either

- Inmarsat-C SDM, Volume 3, Part 2, Chapter 5 + Annex A (referred to below as "Inmarsat"), or,
- Inmarsat modified by IEC 60945 using the most stringent combined set of conditions, or,
- 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 8.2/8.4 of IEC 60945
b)	Relative humidity	"Inmarsat" modified by 8.3 of IEC 60945
c)	Spray	"Inmarsat" modified by 8.8 of IEC 60945
d)	Ice	"Inmarsat"
e)	Precipitation	"Inmarsat" modified by 8.8 of IEC 60945
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
j)	Vibration	"Inmarsat" modified by 8.7 of IEC 60945
k)	Antenna inclinations	"Inmarsat"
l)	Induced acceleration	"Inmarsat"
m)	Velocity	"Inmarsat"
	Corrosion	8.12 of IEC 60945
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, Clauses 9 and 10.

5.3 Radiated spurious emissions

The radiated spurious emission 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 standards 61162.

(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.

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

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

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

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

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

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

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

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

451 5.5 Interfering signals

452 (See 6.8.4)

453 *(MSC.513(105) A2.2) The Inmarsat-C receiver shall be capable of operating in the presence*
454 *of an interfering signal with the following characteristics: a wideband signal of bandwidth*
455 *5 MHz, occupying the band 1 512-1 517 MHz, at a power level of -30 dBm measured at the*
456 *receiver input.*

457 6 Methods of testing and required test results

458 6.1 Overview

459 6.1.1 General

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

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

465 6.1.2 Performance requirements

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

468 6.1.3 Technical characteristics

469 The equipment shall be tested for compliance with the technical characteristics listed in
470 Clause 5 using the methods prescribed in the Inmarsat documentation, but using the
471 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 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.

513 Check that facilities are provided for manual entry of position.

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

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

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

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

521 **6.4 Tests of operational requirements for EGC receivers**

522 **6.4.1 Capabilities**

523 (See 4.4.1)

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

525 **6.4.2 General**

526 (See 4.4.2)

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

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

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

537 **6.4.3 Position and area code updating**

538 (See 4.4.3)

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

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

545 **6.4.4 Indication of receipt of priority message**

546 (See 4.4.4)

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

549 **6.4.5 Indication of tuning and synchronisation**

550 (See 4.4.5)

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

553 **6.4.6 Printing selection**

554 (See 4.4.6)

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

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

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

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

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

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

567 **6.4.7 Printing device**

568 (See 4.4.7)

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

571 **6.5 Tests of performance related requirements from IEC 60945**

572 (See 4.5)

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

574 **6.6 Tests of other requirements**

575 (See 4.6)

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

578 **6.7 Long-range identification and tracking**

579 **6.7.1 General**

580 (See 4.7.1)

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

584 **6.7.2 Capabilities**

585 (See 4.7.2)

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

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

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

594 Check by observation that there are facilities to stop the transmission of LRIT information, to
595 increase the intervals between transmissions to 24 h and to re-enable the transmissions at
596 6 h intervals. Confirm by observation that the operation of the facilities is protected by
597 unauthorised access such as by a password or a key-lock.

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

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

604 **6.7.3 Functionality**

605 (See 4.7.3)

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

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

612 **6.7.4 Communication system**

613 (See 4.7.4)

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

616 Instruct the equipment:

- 617 • to transmit to a LRIT Data Centre. Confirm that the equipment transmits the LRIT data at
618 intervals of 6 h;
- 619 • to transmit LRIT information at 15 min intervals. Confirm that the equipment transmits at
620 15 min intervals;
- 621 • to transmit LRIT information at 60 min intervals. Confirm that the equipment transmits at
622 60 min intervals;
- 623 • with a polling command. Confirm that the equipment transmits the LRIT information within
624 8 min of receiving the polling command;
- 625 • to stop the transmission of LRIT information. Confirm that no information is transmitted
626 within a 90 min period.

627 Use the facilities locally provided on the equipment:

- 628 • to stop the transmission of LRIT information. Confirm that no information is transmitted
629 within a 90 min period;
- 630 • to increase the intervals between transmissions to 24 h. Confirm that transmissions are
631 made at 24 h intervals;
- 632 • to reset the intervals between transmissions to 6 h. Confirm that transmissions are made
633 at 6 h intervals.

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

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

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

640 **6.8 Tests of technical characteristics**

641 **6.8.1 Inmarsat tests**

642 (See 5.1)

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

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

650 **6.8.2 Tests for environmental and electromagnetic compatibility**

651 (See 5.2)

652 The tests for environmental and electromagnetic compatibility are given in IEC 60945,
653 Clauses 8, 9 and 10.

654 For the purposes of IEC 60945 the following terms apply.

655 **Performance test** – a measurement of transmitter power output and frequency response and
656 a measurement of receiver noise temperature and tuning to Inmarsat standards.

657 **Performance check** – successful transmission of a distress alert, distress priority message
658 and reception of maritime safety information.

659 **6.8.3 Interfaces**

660 (See 5.4)

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

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

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

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

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

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

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

676 **6.8.4 Interfering signals**

677 (See 5.5)

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

682 The interfering signal characteristics are 3GPP LTE.

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

684

685

Annex A (normative)

Requirements relating to installation

A.1 General

This annex reproduces those requirements relating to installation as extracted from IMO Resolutions **MSC.513(105)**, MSC.263(84) and MSC.306(87).

A.2 Source of electrical energy

(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

(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.*

(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 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.

739

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

Frequency range ^a MHz	Carrier-on ^b		Carrier-off ^c	
	EIRP limit dBpW	Measurement bandwidth kHz	EIRP limit dBpW	Measurement bandwidth 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 this table should be applied.				

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

742 The EIRP of the unwanted emissions in any 3 kHz bandwidth within the bands 1 626,5 MHz to
743 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 – 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					
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

Inmarsat RTP Table							
Item test designation		A	T	H	P	V	Inmarsat SDM Volume 3, Part 2, Chapter 2
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 (a.c. frequency ± 6 %, voltage ± 10 %, d.c. 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).							
NOTE See Table 2 for variations of environmental conditions.							

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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 (a.c. frequency ±6 % voltage, ±10 %, d.c. 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)							

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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
21-A	Basic access tests						
	Ocean Region registration	X					
21-B	Performance verification	X					
22-A	Message transfer tests						
	To-mobile message transfer	X					
	From-mobile message transfer						
	Off-line operation	X					
22-D	Forced clearing	X					
23-A	Distress alerting tests						
	Distress alert transmission	X					
23-B	Distress priority message transfer						
24-A	Log-in and log-out						
	Log-out and log-in	X					
25-A	Optional capability tests						
	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 (a.c. frequency ± 6 % voltage, ± 10 %, d.c. 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)							

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765 Bibliography

- 766 IEC 61924-2, *Maritime navigation and radiocommunication equipment and systems –*
 767 *Integrated navigation systems – Part 2: Modular structure for INS – Operational and*
 768 *performance requirements, methods of testing and required test results*
- 769 IEC 62729, *Maritime navigation and radiocommunication equipment and systems – Part 1:*
 770 *Shipborne equipment for long-range identification and tracking (LRIT) – Performance*
 771 *requirement*
- 772 IEC 62940, *Maritime navigation and radiocommunication equipment and systems – Integrated*
 773 *communication system (ICS) – Operational and performance requirements, methods of testing*
 774 *and required test results*
- 775 ETSI 3GPP TS 36.104 version 13.2.0 Release 13, *LTE; Evolved Universal Terrestrial Radio*
 776 *Access (E-UTRA); Base Station (BS) radio transmission and reception*
- 777 IMO, *International SafetyNET Manual*
- 778 IMO MSC.1/Circ.1307:2009, *Guidance on the survey and certification of ships with the*
 779 *requirements to transmit LRIT information*
- 780 IMO, *NAVTEX Manual*
- 781 IMO Resolution MSC 252(83), *Performance standards for integrated navigation systems (INS)*
- 782 IMO Resolution MSC.431(98), *Amendments to the revised performance standards for*
 783 *enhanced group call (EGC) equipment (Resolution MSC.306(87))*
- 784 IMO Resolution A.811(19), *Performance standards for a shipborne integrated*
 785 *radiocommunication system (IRCS) when used in the GMDSS*
- 786 Inmarsat, *Inmarsat-C System Definition Manual*
- 787 Inmarsat, *Maritime design and installation guidelines, Annex C, System specific guidelines*
 788 *for Inmarsat-C*
- 789 ISO 2022, *Information technology – Character code structure and extension techniques*
- 790 ITU-R Recommendation M.540-2:1990, *Operational and technical characteristics for an*
 791 *automated direct-printing telegraph system for promulgation of navigational and*
 792 *meteorological warnings and urgent information to ships*
- 793 ITU-T Recommendation T.50, *International reference alphabet (IRA) (formerly international*
 794 *alphabet No. 5 or IA5)*
- 795
- 796
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