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Global maritime distress and safety system (GMDSS) – Part 15: Inmarsat FB500 ship earth station – Operational and performance requirements, methods of testing and required test results

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International Standard IEC 61097-15 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

The text of this standard is based on the following documents:

FDIS	Report on voting
80/660/FDIS	80/667/RVD

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

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

A list of all parts of 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 publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

A bilingual version of this publication may be issued at a later date.

GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS) –

Part 15: Inmarsat FB500 ship earth station – Operational and performance requirements, methods of testing and required test results

1 Scope

This part of IEC 61097 specifies the minimum operational and performance requirements, technical characteristics, methods of testing and required test results for Inmarsat FB500 ship earth stations (SES), capable of transmitting and receiving distress and safety communications, initiating and receiving distress priority calls and transmitting and receiving general radiocommunications, using radiotelephony (voice), as required within Regulation IV/10.1 and 14.1 of the 1988 amendments to the 1974 International Convention for the Safety of Life at Sea (SOLAS), for use in the GMDSS.

This standard covers equipment construction and testing. Matters relating to installation are reproduced in Annex A.

NOTE The Inmarsat FB500 is intended to meet the voice requirements of IMO Resolution A.1001(25). In order to meet the GMDSS carriage requirements of SOLAS in respect of receipt of SafetyNET broadcasts and direct printing telegraphy, it is necessary to install a combined Inmarsat C/EGC transceiver in addition to the Inmarsat FB500 equipment. Annex B provides more information.

This standard incorporates the performance standards of IMO Resolution MSC.130(75) and also takes into account the priority access (voice pre-emption) requirements of IMO Resolution A.1001(25). This standard takes account of IMO Resolution A.694(17) associated with IEC 60945. When a requirement in this standard is different from IEC 60945, the requirement in this standard takes precedence.

All text of this standard, whose wording is identical to that in the IMO Resolutions is printed in italics and the Resolution and paragraph number indicated between brackets.

Responsibility for type approval of Inmarsat FB500 is vested in Inmarsat by IMO Resolution MSC.130(75) (see 4.2). Therefore, this standard does not reproduce Inmarsat test procedures in full, but refers to the relevant tests in Annex C. It is recommended that equipment manufacturers rationalize the test requirements of this standard and those of Inmarsat before embarking on the approval process.

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.

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

IEC 61162 (all parts), *Maritime navigation and radio communication equipment and systems – Digital interfaces*

IEC 61162-1:2010, *Maritime navigation and radio communication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

IMO, *International Convention for the safety of life at sea (SOLAS),1974 as amended*

IMO Resolution A.694(17), *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.1001(25), *Criteria for the provision of mobile-satellite communication systems in the Global Maritime Distress and Safety System (GMDSS)*

IMO Resolution MSC.130(75), *Performance standards for Inmarsat ship earth stations capable of two-way communications*

Inmarsat *BGAN System Definition Manual*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following definitions apply.

3.1.1
BGAN on the bench
BOB
item of test equipment (test set) designed to simulate the combined operation of an Inmarsat satellite and an Inmarsat FB500 voice transmission path

3.1.2
Inmarsat priorities
priority 3 = distress priority,
priority 2 = urgency priority,
priority 1 = safety priority,
priority 0 = routine

3.1.3
Inmarsat type approval
testing of a ship earth station design by Inmarsat

Note 1 to entry: This approval is required for access to the Inmarsat space segment and is essential before approvals can be granted by national administrations.

3.1.4
L-band
frequency band in the range 1,4 GHz to 1,7 GHz allocated to the mobile satellite service and in which the EUT transmits and receives

3.1.5
performance check
for the purposes defined in IEC 60945, check comprising standard tests A and B

3.1.6
performance test
for the purposes defined in IEC 60945, test comprising standard tests A and B, carried out for both distress and safety priorities

3.1.7
pre-emption
automatic clearance of an ongoing call to enable a call of higher priority to be established

3.1.8
radio frequency hazards
hazards caused by electromagnetic radiofrequency radiation, whose level would require safety rules to be applied in the vicinity of the radiating equipment

3.1.9
radome
radiofrequency transparent cover placed over an antenna system

3.1.10
SafetyNET
service provided over a dedicated Inmarsat C carrier, for the dissemination of maritime safety information, such as distress alerts, weather forecasts and coastal warnings

3.1.11
standard tests
two tests defined in this standard as Test A – Duplex telephone test (ship-originated) and Test B – Duplex telephone test (shore-originated) which together form the performance test required by IEC 60945

3.2 Abbreviations

EGC	Enhanced Group Call
EIRP	Effective Isotropic Radiated Power
EUT	Equipment Under Test
GMDSS	Global Maritime Distress and Safety System
IMO	International Maritime Organization
Inmarsat	Inmarsat Global Ltd.
ISO	International Organization for Standardization
ITU	International Telecommunications Union
MSI	Maritime Safety Information
NAS	Non-Access Stratum (a third generation partnership project standard)
RAN	Radio Access Network
RCC	Rescue Coordination Centre
SDM	System Definition Manual (published by Inmarsat)
SES	Ship Earth Station
SOLAS	International convention for the Safety Of Life At Sea
UT	User Terminal

4 General and operational requirements

4.1 General

(See 6.2)

(MSC.130/A.1) *The ship earth station installation capable of telephony and data communications* shall *comply with the general requirements set out in resolution A.694(17) and with the following minimum requirements.*

An Inmarsat FB500 ship earth station, which is defined in the Inmarsat BGAN SDM, is capable of

- transmitting and receiving distress and safety communications,
- initiating and receiving distress priority calls, and
- transmitting and receiving general radio communications, using radiotelephony.

The equipment shall comply with the general requirements of IEC 60945, as applicable to the equipment category, for example “protected”, “exposed”.

4.2 Inmarsat type approval

(MSC.130/A.2) *The equipment* shall *be type approved by Inmarsat and* shall *comply with the environmental conditions specified in its technical requirements for Inmarsat ship earth stations capable of two-way communications.*

NOTE Inmarsat type approval is required for access to the Inmarsat space segment and is essential before approvals are granted by national administrations.

4.3 Prevention of alteration of ship earth station identity

(See 6.3)

(MSC.130/A3.1) *No control external to the equipment* shall *be available for alteration of the ship station identity.*

4.4 Initiation of distress alerts

(See 6.4)

(MSC.130/A.3.2) *It* shall *be possible to initiate and make distress calls by telephony or data communications from the position at which the ship is normally navigated and from any position designated for distress alerting. In addition, where a room is provided for radio communications, means to initiate distress calls* shall *also be fitted in that room.*

A suitable interface on the EUT to enable these two requirements to be achieved shall be provided by the equipment manufacturer.

4.5 Dedicated distress button

(See 6.4)

(MSC.130/A3.5) *A distress call* 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.*

(MSC.130/A3.6) *The dedicated distress button* shall*:*

1) *be clearly identified; and*
2) *be protected against inadvertent operation.*

(MSC.130/A3.7) *The distress alert initiation* shall *require at least two independent actions.*

(MSC.130/A3.4) *It* shall *be possible to interrupt and initiate distress messages at any time.*

Inmarsat FB500 Service definition provides the following clarification. The UT should ensure that selection of Maritime Distress priority shall not become effective until the switch contacts have been continuously held closed for a period of at least 6 s.

Audible and visible indications shall be made at all positions from where a distress call may be initiated, irrespective of the telephone terminal from which the distress call is originated. The visible indications shall continue until reset manually. It shall be possible to initiate further distress calls without re-setting the first indication. During performance testing with distress priority, indications shall be identical to those generated by the initiation of a real distress call.

4.6 Alarm on reception of shore-originated duplex calls with distress priority

(See 6.5)

(MSC.130/A.3.3) *Where no other means of receiving distress, urgency and safety broadcasts or an additional distress alert relay are provided and existing levels of aural signals produced by the telephone or printer are considered to be inadequate, the ship earth station equipment* shall *provide an aural/visual alarm of appropriate level*.

An output shall be provided to actuate an external aural/visual alarm on the receipt of a distress priority duplex call.

NOTE Distress, urgency and safety broadcasts are received by associated Inmarsat-C/EGC receiving equipment, see Annex B.

4.7 Radio frequency hazards

(See 6.6)

(MSC.130/A.4) *In order to permit warnings of potential hazards to be displayed in appropriate places, a label* shall *be attached to the radome by the equipment manufacturer, indicating the distance at which radiation levels of 100 W/m^2, 25 W/m^2 and 10 W/m^2 exist.*

The label shall have characters at least 10 mm high. The maximum distance from the EUT at which the power density level of 100 W/m^2 has been measured by the equipment manufacturer shall be included in the equipment manual. The power density at this distance shall be re-measured and the level specified in the equipment manual and on the label confirmed.

4.8 Equipment manual

(See 6.6)

In addition to the requirements of IEC 60945 the manual shall contain information for the installation to comply with IMO requirements as detailed in Annex A.

The manual shall also address the issue of reception of maritime safety information (MSI) (see Annex B).

The manual shall also include a cautionary note to the effect that, before clearance of a distress priority call is initiated, the RCC shall be advised as to why the call is being cleared.

The manual shall include the maximum distance from the radome at which a power density of 100 W/m^2 has been measured by the manufacturer of the EUT.

5 Technical requirements

5.1 General

IMO Resolution MSC.130(75) appoints Inmarsat as the type approval authority for Inmarsat FB500 SES (see 4.2). The Inmarsat BGAN SDM is, therefore, the primary source of technical characteristics for Inmarsat FB500 SES for use in the GMDSS, but the following amendments and additions shall apply.

5.2 Pre-emption by distress calls (ship originated)

(See 6.7, 6.8)

On initiation of a distress priority call the EUT shall interrupt any on-going call of lower priority, if necessary, and then set up the distress priority call automatically.

5.3 Power supply interruption

(See 6.9)

(MSC.130/5.2) *Changing from one source of supply to another or any interruption up to 60 s of the supply of electrical energy* shall *not render the equipment inoperative or require the equipment to be manually re-initialized.*

Programmable functions stored in memory shall not be lost on power-down and power-up of the equipment.

5.4 Interfaces

(See 6.10)

Inmarsat FB500 equipment has no mandatory requirements for interfaces. However, if interfaces to external sensors and sources are provided, which comply with IMO Resolutions and ITU Recommendations, they shall comply with the IEC 61162 series.

Any additional interface capability used to meet a required interface in the absence of an appropriate IEC 61162 series interface, for example, proprietary input or output sentences, shall be fully documented.

Any critical or unique interface characteristics, for example, timing, resulting actions or equipment behaviour due to receiving or transmitting a sentence, which are additional to those specified in the IEC interface standard, shall be fully documented.

6 Methods of testing and required test results

6.1 General

6.1.1 Test arrangements

The requirements of this clause are in addition to the Inmarsat requirements for type approval, given in the Inmarsat BGAN SDM. The manufacturer shall, unless otherwise agreed, set up the equipment and ensure it is operating normally before testing commences. If the test site used for type approval is also an accepted Inmarsat test facility, both series of tests may be combined, with the prior agreement of Inmarsat and the national test authority.

After successful completion of the Inmarsat Phase I tests (see Inmarsat BGAN SDM) compliance with the requirements of this standard shall be demonstrated by carrying out the tests described in this Clause. These tests shall be conducted using a BOB or an alternative method of functionally achieving the same result.

Verification of compliance with the technical requirements is provided by performance tests or performance checks at normal test conditions unless otherwise stated.

6.1.2 Measurement uncertainties

Measurement uncertainty shall be calculated and techniques employed to minimize its range. This uncertainty shall be applied to the limit and any measurement falling below the range is deemed acceptable. See ISO/IEC 17025.

6.1.3 Definition of standard tests

Standard tests comprise the setting-up and clearing-down of telephone calls with different priorities, with a subjective check of the circuit quality.

NOTE Definitions of operating conditions and quality of circuits are described in ITU-R Recommendation BS 1284.

Test A: Duplex telephone test (ship originated)

The EUT operator shall set up a duplex telephone channel with the appropriate priority.

The EUT operator shall say clearly:

“This is the EUT operator performing test A, alpha. Please report my speech quality. Over”

The test set operator shall reply:

“This is the test set operator performing test A, alpha. Your speech quality is good/poor. Please report my speech quality. Over”

The EUT operator shall reply:

“Your speech quality is good/poor. I am now clearing the channel. Over”

The EUT operator shall clear the call.

Test B: Duplex telephone test (shore originated)

The test set operator shall set up a duplex telephone channel with the appropriate priority.

The test set operator shall say clearly:

“This is the test set operator performing test B, bravo. Please report my speech quality. Over”

The EUT operator shall reply:

“This is the EUT operator performing test B, bravo. Your speech quality is good/poor. Please report my speech quality. Over”

The test set operator shall reply:

“Your speech quality is good/poor. I am now clearing the channel. Over”

The test set operator shall clear the call.

6.1.4 Required results from standard tests

For the performance checks and tests in A and B for voice communication, calls shall be set up and cleared down satisfactorily. The correct priority shall be received at the BOB or the EUT as appropriate. Voice quality shall be good in both directions and it shall be possible to distinguish clearly the content of the voice messages.

6.2 General requirements

The equipment shall be tested for compliance with the requirements of IEC 60945.

The manufacturer shall state which items of equipment are classified as exposed and which are protected. The equipment normally protected by a radome shall be tested with the radome *in situ* under the “exposed” environmental conditions stated in IEC 60945.

A performance check or test shall normally consist of telephony tests between the EUT and an Inmarsat BOB. Alternatively, this may be verified by performing loop back tests.

For the purposes defined in IEC 60945:

Performance check: shall comprise standard tests A and B, carried out for distress priority only.

Performance test: shall comprise standard tests A and B, carried out for both distress and safety priorities.

NOTE See 6.8 for the test for immunity to power supply failure.

6.3 Prevention of alteration of ship earth station identity

(See 4.3)

Check by observation of the equipment and inspection of manufacturer’s documentation that there is no control external to the equipment which can enable the ship earth station identity to be altered.

6.4 Distress alerts

(See 4.4, 4.5)

6.4.1 Distress initiation

Check by observation of the equipment and inspection of manufacturer’s documentation that the equipment has interfaces suitable to enable the initiation and making of distress calls from two different positions.

Check by observation that dedicated distress buttons are provided with the equipment and confirm by observation that their design and operation complies with the requirements for distress alert in IEC 60945.

Confirm by observation that, when a distress button is operated, the audible and visible indications are all made at the positions from which distress calls can be made.

Confirm by observation that facilities have been provided to reset visual indications at all the positions from which distress calls can be made.

6.4.2 Test using local distress button

6.4.2.1 Purpose

This test checks the operation of the EUT when setting up a distress call using the local distress button and subsequently clearing it down by whatever means.

6.4.2.2 Method of test

See tests in 6.7 and 6.8 for operational tests.

6.4.2.3 Required results

Results shall be in accordance with 6.1.4.

6.4.3 Test using remote distress button

6.4.3.1 Purpose

This test checks the operation of the EUT when setting up a distress call using the remote distress button and subsequently clearing it down by whatever means.

6.4.3.2 Method of test

Test A shall be performed using distress priority, the call being set up using a remote distress button, located at least 10 m away from the EUT.

6.4.3.3 Required results

Results shall be in accordance with 6.1.4.

6.5 Distress priority alarm

(See 4.6)

Check by observation that the equipment is provided with an interface for an external alarm.

By connecting a suitable alarm to the interface check by observation that the alarm is activated on receipt of a distress priority duplex call.

6.6 Labels and manual

(See 4.7, 4.8)

Confirm by observation that the required information is provided on a label and that the required information is provided in the equipment manual.

6.7 Operational tests (without pre-emption)

(See 5.2)

6.7.1 Purpose

These tests ensure that shore-originated and ship-originated calls can be set up with different priorities and subsequently cleared down.

6.7.2 Method of test

The combination of standard tests and priorities as indicated in Table 1 shall be performed.

Table 1 – Testing with different priorities

Test	Priority
Test A	Distress priority (3)[a]
Test A	Urgency priority (2)
Test A	Safety priority (1)
Test A	Routine priority (0)
Test B	Distress priority (3)
Test B	Routine priority (0)

[a] This test call shall be set up using a "local" distress button designed to be co-located with the EUT.

6.7.3 Required results

Results shall be in accordance with 6.1.4.

6.8 Operational tests (with pre-emption)

(See 5.2)

6.8.1 Purpose

These tests are to verify correct pre-emption of lower priority calls by calls of higher priority.

6.8.2 Method of test

NOTE Only pre-emption by ship-originated calls is tested here. Pre-emption by shore-originated calls has been tested by Inmarsat during Inmarsat FB500 infrastructure commissioning.

All priority 3 tests shall be set up from the local distress button, as follows.

a) Duplex telephone calls shall be set up from the EUT with each of the priorities (0, 1, 2, 3) shown in column 1 of Table 2. Test A shall then be performed with all of the priorities (0, 1, 2, 3) shown in column 2, without first clearing the original call in progress. The required outcomes are shown in column 3.

b) Duplex telephone calls shall be set up from the BOB with each of the priorities (0, 3) shown in column 1 of Table 3. Test A shall then be performed with all of the priorities (0, 1, 2, 3) shown in column 2, without first clearing the original call in progress. The required outcomes are shown in column 3.

c) Duplex facsimile calls shall be set up from the EUT each with priority 0 (only priority available) as shown in column 1 of Table 4. Test A shall then be performed with all of the priorities (0, 1, 2, 3) shown in column 2, without first clearing the original call in progress. The required outcomes are shown in column 3.

d) Duplex facsimile calls shall be set up from the BOB each with priority 0 (only priority available) as shown in column 1 of Table 5. Test A shall then be performed with all of the priorities (0, 1, 2, 3) shown in column 2, without first clearing the original call in progress. The required outcomes are shown in column 3.

e) Duplex 64 kbit/s circuits shall be set up from the EUT (only priority 0 available). Test A shall then be performed with all the priorities (0, 1, 2, 3) shown in column 2 of Table 6, without first clearing the original call in progress. The required outcomes are shown in column 3.

f) Duplex 64 kbit/s circuits shall be set up from the BOB (only priority 0 available). Test A shall then be performed with all the priorities (0, 1, 2, 3) shown in column 2 of Table 7, without first clearing the original call in progress. The required outcomes are shown in column 3.

g) Duplex 3,1 kHz audio circuits shall be set up from the EUT (only priority 0 available). Test A shall then be performed with all the priorities (0, 1, 2, 3) shown in column 2 of Table 8, without first clearing the original call in progress. The required outcomes are shown in column 3.

h) Duplex 3,1 kHz audio circuits shall be set up from the BOB (only priority 0 available). Test A shall then be performed with all the priorities (0, 1, 2, 3) shown in column 2 of Table 9, without first clearing the original call in progress. The required outcomes are shown in column 3.

i) Duplex telephone calls shall be set up from the EUT with each of the priorities (0, 1, 2, 3) shown in column 1 of Table 10. 3,1 kHz audio calls shall then be attempted from the EUT (only priority 0 available) without first clearing the original call in progress. The required outcomes are shown in column 3.

j) Duplex telephone calls shall be set up from the BOB with each of the priorities (0, 3) shown in column 1 of Table 11. 3,1 kHz audio shall then be attempted from the EUT (only priority 0 available) without first clearing the original call in progress. The required outcomes are shown in column 3.

6.8.3 Required results

Telephone calls set up from the EUT shall automatically pre-empt on-going calls of a lower priority of any type, no matter whether set up originally from the EUT or from BOB. Pre-empted calls shall clear in accordance with normal clearing procedures and the higher priority telephone call shall then be set up automatically. Results shall be in accordance with 6.1.4. Tables 2 to 11 indicate the required test results for items a) to j) of 6.8.2.

Table 2 – Pre-emption of telephone call set up from ship

Priority of original telephone call set up at ship	Priority of subsequent telephone call set up from ship (from another authorized extension)	Pre-emption required?
0	0	No
0	1	Yes
0	2	Yes
0	3	Yes
1	0	No
1	1	No
1	2	Yes
1	3	Yes
2	0	No
2	1	No
2	2	No
2	3	Yes
3	0	No
3	1	No
3	2	No
3	3	No
NOTE Inmarsat priorities are used.		

Table 3 – Pre-emption of telephone call set up from shore

Priority of telephone call set up from shore	Priority of subsequent telephone call set up from ship (from another authorized extension)	Pre-emption required?
0	0	No
0	1	Yes
0	2	Yes
0	3	Yes
3	0	No
3	1	No
3	2	No
3	3	Yes[a]
NOTE Inmarsat priorities are used.		
[a] A ship-originated distress call shall take precedence over a shore-originated call with distress priority.		

Table 4 – Pre-emption of facsimile call set up from ship

Priority of original facsimile call set up at ship	Priority of subsequent telephone call set up from ship (from another authorized extension)	Pre-emption required?
0	0	No
0	1	Yes
0	2	Yes
0	3	Yes
NOTE Inmarsat priorities are used.		

Table 5 – Pre-emption of facsimile call set up from shore

Priority of original facsimile call set up from shore	Priority of subsequent telephone call set up from ship (from another authorized extension)	Pre-emption required?
0	0	No
0	1	Yes
0	2	Yes
0	3	Yes
NOTE Inmarsat priorities are used.		

Table 6 – Pre-emption of 64 kbit/s call set up from ship

Priority of original 64 kbit/s call set up at ship	Priority of subsequent telephone call set up from ship (from another authorized extension)	Pre-emption required?
0	0	No
0	1	Yes
0	2	Yes
0	3	Yes
NOTE Inmarsat priorities are used.		

Table 7 – Pre-emption of 64 kbit/s call set up from shore

Priority of 64 kbit/s call set up from shore	Priority of subsequent telephone call set up from ship (from another authorized extension)	Pre-emption required?
0	0	No
0	1	Yes
0	2	Yes
0	3	Yes
NOTE Inmarsat priorities are used.		

Table 8 – Pre-emption of 3,1 kHz audio call set up from ship

Priority of original 3,1k audio call set up at ship	Priority of subsequent telephone call set up from ship (from another authorized extension)	Pre-emption required?
0	0	No
0	1	Yes
0	2	Yes
0	3	Yes
NOTE Inmarsat priorities are used.		

Table 9 – Pre-emption of 3,1 kHz audio call set up from shore

Priority of 3,1 kHz audio call set up from shore	Priority of subsequent telephone call set up from ship (from another authorized extension)	Pre-emption required?
0	0	No
0	1	Yes
0	2	Yes
0	3	Yes
NOTE Inmarsat priorities are used.		

Table 10 – Non-pre-emption of high-priority ship-originated telephone call by subsequent lower priority ship-originated calls

Priority of on-going telephone call	Type of subsequent call (Priority 0)	Pre-emption required?
0	3,1 kHz audio	No
1	3,1 kHz audio	No
2	3,1 kHz audio	No
3	3,1 kHz audio	No

Table 11 – Non-pre-emption of high-priority shore-originated telephone call by subsequent lower priority ship-originated calls

Priority of on-going telephone call	Type of subsequent call (Priority 0)	Pre-emption required?
0	3,1 kHz audio	No
3	3,1 kHz audio	No

6.9 Power supply

(See 5.3)

6.9.1 Purpose

To test the EUT for compliance with the power supply requirements as set out in IMO Resolution A.694(17) and detailed in IEC 60945 and the special requirements of 5.3.

6.9.2 Method of test

The national administration shall agree to this test with Inmarsat at least 7 days before the test is performed. Inmarsat will make arrangements with a cooperating RCC and advise the national administration of its identity and associated RAN at least 24 h before testing commences.

The EUT shall be set to acquire an Inmarsat satellite. The EUT shall then be subjected to the power supply interruptions described in IEC 60945. Unwanted transmissions from the antenna shall be detected by means of a test antenna located in an antenna sidelobe and a spectrum analyser or broadband power meter. Alternatively, a coupler in the feeder to the antenna of the EUT may be used to deliver power to the test equipment.

Three minutes after each power supply interruption, a ship-originated priority 3 voice call shall be set up from the EUT to the cooperating RCC. At the end of each call, the call shall be cleared from the EUT.

6.9.3 Result required

During and after each power supply interruption, no unwanted transmissions shall be detected.

After each power supply interruption, there shall be no corruption of operational software and no essential data shall be lost.

The EUT shall recover after each power supply interruption in accordance with performance Criterion B of IEC 60945, within 3 min of power being restored.

Priority 3 test calls to the cooperating RCC shall be successful. Speech quality shall be good in both directions. Calls shall clear down successfully at the end of each call.

6.10 Interfaces

(See 5.4)

Where interfaces to external sensors and sources, which comply with IMO Resolutions and ITU Recommendations are provided (interfaces that conform to IEC 61162), these interfaces shall be tested in accordance with the relevant annex of IEC 61162, for example, Annex B of IEC 61162-1:2010.

Any additional interfaces based on the IEC 61162 series shall be tested to the appropriate IEC 61162 standard.

Any critical or unique interface characteristics, for example, timing, resulting actions or equipment behaviour due to receipt or transmission of a sentence, shall be identified and the manufacturer should provide a detailed test method for each critical interface characteristic.

Annex A
(normative)

Requirements relating to installation

A.1 General

The equipment manual shall include all information necessary to determine whether the EUT complies with the IMO installation requirements.

A.2 Power supply

(MSC.130/A.5.1) *The ship earth station* 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 and all equipment necessary for its normal functioning, including the antenna tracking system, from an alternative source of energy.*

A.3 Antenna siting

(MSC.130/A.6.1) *It is desirable that the antenna be sited in such a position that no obstacle likely to significantly degrade the performance of the equipment appear in any azimuth down to an angle of elevation of –5°.*

(MSC.130/A.6.2) *The siting of the antenna needs careful consideration, taking into account the adverse effect of high levels of vibration which might be introduced by the use of a tall mast and the need to minimize shadow sectors. Objects, especially those within 10 m of the radome which cause a shadow sector of greater than 6°, are likely to significantly degrade the performance of the equipment.*

(MSC.130/A.6.3) *The above deck equipment* shall *be separated, as far as is practicable, from the antennae of other communication and navigation equipment.*

Annex B
(informative)

Reception of maritime safety information (MSI)

MSI is broadcast currently by means of the NAVTEX and SafetyNET systems. Inmarsat FB500 provides neither of these services. Reception of MSI is thus dependent on appropriate additional receiving equipment, for example, a SafetyNET receiver, an Inmarsat-C transceiver capable of receiving SafetyNET transmissions or a NAVTEX receiver, being included in the GMDSS installation. (See IEC 61097-4 and IEC 61097-6.)

Annex C
(informative)

List of Inmarsat FB500 type-approval tests

Table C.1 gives the tests which are performed during Inmarsat type approval. The requirements for the tests are given in the Inmarsat BGAN System Definition Manual. UT manufacturers are advised to make available Inmarsat type approval test results to national administrations on request.

Table C.1 – List of Inmarsat tests

1	Radiation pattern	18	Tx tuning range
2	Polarisation	19	Tx frequency accuracy and stability
3	Axial ratio	20	Modulator performance
4	Pointing loss	21	Tx burst characteristics
5	G/T determination	22	Reporting N/A
6	Rx tuning range	23	C/No measurement and report
7	QPSK frame acquisition	24	Tx coding performance
8	QPSK PER	25	Tx burst timing accuracy and stability
9	QAM frame acquisition	26	Transmitter power spectral density
10	QAM PER	27	N/A
11	QPSK selectivity	28	Code rate detection
12	QAM selectivity	29	Doppler compensation
13	Rx dynamic range	30	Handset audio levels and Bluetooth audio
14	EIRP	31	DTMF via audio channel tests
15	Tx Off Level	32	Echo canceller tests
16	Spurious and harmonics	33	Voice Codec testing using VCTS
17	Tx phase noise		

The UT should also comply with the protocol test defined as part of the Inmarsat FB500 type approval:

- Adaption layer
- Bearer connection layer
- Bearer control layer
- NAS
- ISDN

Bibliography

IEC 61097-4, *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 61097-6, *Global maritime distress and safety system (GMDSS) – Part 6: Narrowband direct-printing telegraph equipment for the reception of navigational and meteorological warnings and urgent information to ships (NAVTEX)*

ITU-R Recommendation BS.1284-1, *General methods for the subjective assessment of sound quality*

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