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Global maritime distress and safety system (GMDSS) –

Part 13: INMARSAT F77 ship earth station equipment – Operational and performance requirements, methods of testing and required test results

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GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS) –

Part 13: INMARSAT F77 ship earth station equipment – Operational and performance requirements, methods of testing and required test results

FOREWORD

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International Standard IEC 61097-13 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
80/358/FDIS	80/370/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.

The committee has decided that the contents of this publication will remain unchanged until 2008-01. At this date, the publication will be

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- withdrawn;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

GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS) –

Part 13: INMARSAT F77 ship earth station equipment – 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 F77 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.

The INMARSAT F77 is intended to meet the voice requirements of IMO Resolution A.888(21). 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 F77 equipment. Annex B provides more information. Since Class 1 INMARSAT A and B ship earth stations meet the data requirement of GMDSS, although not necessarily those of MSC.130(75), the F77 cannot necessarily be considered as a direct replacement for these ship earth stations.

This standard also takes into account the priority access (voice pre-emption) requirements of IMO Resolution A.888(21).

This standard takes account of IMO Resolution A.694(17) to which is associated IEC 60945. When a requirement in this standard is different from IEC 60945, the requirement in this standard shall take precedence.

This standard incorporates the performance standards of IMO Resolution MSC.130(75) and the clarifications of certain requirements in IMO performance standards for GMDSS Equipment defined in IMO MSC Circular 862. It also incorporates the relevant ITU Radio Regulations.

All text of this standard, whose wording is identical to that in the IMO SOLAS Convention 1974 as amended, IMO Resolutions and IMO MSC Circular 862, is printed in *italics* and the Resolution or Recommendation and paragraph number indicated between brackets.

It is a requirement of INMARSAT Ltd that all INMARSAT F77 mobile earth station models be type-approved by INMARSAT before they can be allowed access to the INMARSAT space segment. This testing is designed to demonstrate that the equipment under test will be compatible with the INMARSAT F77 system and will not cause interference to other satellite users. It is recommended that approval authorities accept testing organized and supervised by INMARSAT, which results in INMARSAT type approval, without additional testing other than that defined in this standard.

It is also recommended that equipment manufacturers rationalize the test requirements of this standard and those of INMARSAT before embarking on the approval process.

NOTE This standard does not incorporate the INMARSAT system requirements needed for INMARSAT type approval. For these, the latest edition of "INMARSAT mini-M SDM Change Note No. 65" should be consulted. When a requirement in this standard is different from one in the above-mentioned INMARSAT document, reference shall be made to the most recent IMO and ITU applicable documents to resolve the difficulty.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60945, *Maritime navigation and radio communication 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, *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)

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.888(21), *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*

IMO MSC Circular 862, *Clarifications of certain requirements in IMO performance standards for GMDSS Equipment*

INMARSAT mini-M SDM Change Note No. 65

ITU Radio Regulations

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1.1
carrier-to-noise density ratio
ratio of unmodulated carrier power-to-noise power normalized to a 1 Hz bandwidth

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

3.1.3
INMARSAT type approval
testing of a ship earth station design by INMARSAT. 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
necessary bandwidth
for a given class of emission, width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions

3.1.6
out-of-band emission
emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious emissions

3.1.7
performance check
short functional test carried out during or after a technical test to confirm that the equipment operates

[IEC 60945]

3.1.8
performance test

measurement or group of measurements carried out during or after a technical test to confirm that the equipment complies with selected parameters as defined in this standard

[IEC 60945]

3.1.9
physical layer test-set (PLT)
item of test equipment designed to simulate the combined operation of an INMARSAT satellite and an INMARSAT F77 Land Earth Station. The PLT interfaces to the EUT at L-band, either by means of a small antenna or via coaxial cable. It permits voice calls to be set up in accordance with the relevant INMARSAT F77 protocols

3.1.10
pre-emption
automatic clearance of an ongoing call to enable a call of higher priority to be established

3.1.11
radiofrequency hazards
hazards caused by electromagnetic radiofrequency radiation, the level of which would require safety rules to be applied in the vicinity of the radiating equipment

3.1.12
radome
radiofrequency transparent cover placed over an antenna system

3.1.13
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

3.1.14
spurious emissions
emissions on a frequency or frequencies which are outside the necessary bandwidth, the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out-of-band emissions

3.1.15
standard tests
two tests defined in this document 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

3.1.16
unwanted emissions
spurious emissions and out-of-band emissions

3.2 Abbreviations

ACSE	Access control and signalling equipment
BER	Bit error rate
BPSK	Binary phase shift keying
C/No	Carrier-to-noise density ratio in 1 Hz bandwidth
EGC	Enhanced group call
EIRP	Effective isotropic radiated power
EMC	Electromagnetic compatibility
EUT	Equipment under test
GMDSS	Global maritime distress and safety system
G/T	Satellite receiver "figure of merit"
HPA	High power amplifier
ID	Identity
IEC	International Electrotechnical Commission
IMO	International Maritime Organization
INMARSAT	INMARSAT Ltd.
ISO	International Organization for Standardization
ITU	International Telecommunications Union
LES	Land earth station
LESP	Land earth station packet data channel
MES	Mobile earth station
MESP	Mobile earth station packet data channel
MPDS	INMARSAT's mobile packet data service (for example, Internet access)
MSI	Maritime safety information
16-QAM	Quaternary amplitude modulation (16-state)
O-QPSK	Offset quaternary phase shift-keying
PLT	Physical layer test-set
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

4 General and operational requirements

This Clause 4 includes the requirements taken from IMO SOLAS and IMO Resolutions MSC.130(75) and A.694(17) for which no repeatable or verifiable test can be specified or for which the test is limited to the verification of documentation presented by the manufacturer. It contains all operational tests, particularly those involving subjective judgement and which shall be conducted by personnel approved by national administrations. Some of the requirements listed in this clause are in addition to the relevant operational requirements of IEC 60945, which are also applicable.

4.1 General requirements

4.1.1 Definition

An INMARSAT F77 ship earth station, which is defined in the "INMARSAT mini-M SDM Change Note No. 65", shall be capable of

a) transmitting and receiving distress and safety communications;

b) initiating and receiving distress priority calls; and

c) transmitting and receiving general radio communications, using radiotelephony.

4.1.2 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.* INMARSAT type approval is required for access to the INMARSAT space segment and is essential before approvals can be granted by national administrations.

4.1.3 Ship earth station installation requirements

(MSC.130/A.1) *The ship earth station installation* (which will normally comprise an INMARSAT F77 transceiver and an additional INMARSAT-C/EGC transceiver) *capable of telephony and data communications* shall *comply with the* applicable *general requirements set out in* IMO *resolution* A.694(17) as detailed in IEC 60945.

4.2 Operational requirements for INMARSAT F77 SES

4.2.1 Prevention of alteration of ship earth station identity

(MSC.130/A.3.1) *No control external to the equipment* shall *be available for alteration of the ship* earth *station identity*.

4.2.2 Initiation of distress calls

(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.

4.2.3 Dedicated distress button

4.2.3.1 Distress activation

(MSC.130/A.3.5) *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/A.3.4) *It* shall *be possible to interrupt and initiate distress calls at any time.*

(MSC.130/A.3.6) *The dedicated button* shall

.1 be clearly identified; and

.2 be protected against inadvertent operation.

(MSC.130/A.3.7) *The distress call initiation* shall *require at least two independent actions.*

4.2.3.2 Clarification (MSC Circular 862)

MSC Circular 862 provides the following clarifications by IMO:

"*DEDICATED DISTRESS BUTTON" – This button should not be any key of an ITU-T input panel or an ISO keyboard associated with the equipment and should be physically separated from functional buttons/keys used for normal operation. This button should be a single button for no other purpose than to initiate a distress alert.*

"CLEARLY IDENTIFIED" – The distress button should be red in colour and marked "DISTRESS". Where a non-transparent protective lid or cover is used, it should also be marked "DISTRESS".

"PROTECTED AGAINST INADVERTENT ACTIVATION" – The required protection of the distress button should consist of a spring-loaded lid or cover permanently attached to the equipment for example, *hinges. It should 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 should generate a visible and audible indication. The distress button should be kept pressed for at least 3 seconds. A flashing light and an intermittent acoustic signal should start immediately. After 3 seconds the transmission of the distress alert is initiated, the visible *indication* shall *become steady* and the acoustic indication shall cease.

NOTE INMARSAT F 1 Service definition provides the following clarification. The MES 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 5 s.

"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 the second independent action.

4.2.3.3 Indications of distress call initiation

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. This reset facility shall only be available to authorized personnel. 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 initiation of a real distress call.

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

(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. (Distress, urgency and safety broadcasts are received by associated INMARSAT-C/EGC receiving equipment – Annex B refers)