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**Global maritime distress and safety  
system (GMDSS) –**

**Part 12:**

**Survival craft portable two-way**

**VHF radiotelephone apparatus –**

**Operational and performance requirements,  
methods of testing and required test results**

IEC 61097-12:1996

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**Systeme mondial de detresse et de securite  
en mer (SMDSM) –**

**Partie 12:**

**Radiotéléphone émetteur-récepteur portable VHF  
pour embarcation de sauvetage –**

**Exigences d'exploitation et de fonctionnement,  
méthodes d'essai et résultats d'essai exigés**



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- IEC 878: *Graphical symbols for electromedical equipment in medical practice.*

The symbols and signs contained in the present publication have either been taken from IEC 27, IEC 417, IEC 617 and/or IEC 878, or have been specifically approved for the purpose of this publication.

## IEC publications prepared by the same technical committee

The attention of readers is drawn to the end pages of this publication which list the IEC publications issued by the technical committee which has prepared the present publication.

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# INTERNATIONAL ELECTROTECHNICAL COMMISSION

## GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS) – Part 12: Survival craft portable two-way VHF radiotelephone apparatus – Operational and performance requirements, methods of testing and required test results

### FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 1097-12 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
80/126/FDIS	80/136/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.

Annexes A and B form an integral part of this standard.

Annex C is for information only.

The French version of this standard will be issued separately.

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**GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS) –  
Part 12: Survival craft portable two-way VHF radiotelephone apparatus –  
Operational and performance requirements, methods of  
testing and required test results**

NOTE – All text of this standard, whose wording is identical to that in IMO Resolutions A.809(19) and A.694(17) and ITU-R M.489-2 is printed in *italics* and the Resolution/Recommendation and paragraph numbers are indicated in brackets.

**2 Normative references**

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 1097. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 1097 are encouraged to investigate the possibility of applying the most recent edition of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 529: 1989, *Degrees of protection provided by enclosures (IP code)*

IEC 945: 1994, *Marine navigational equipment – General requirements – Methods of testing and required test results*

IMO International Convention for the Safety of Life At Sea (SOLAS): 1974, as amended 1988 (GMDSS) – *Chapter III: Life-saving appliances and arrangements*

IMO Resolution A.694(17): 1991, *General requirements for shipborne radio equipment forming part of the global maritime distress and safety system (GMDSS) and for electronic navigational aids*

IMO Resolution A.809(19): 1995, *Performance standards for survival craft two-way VHF radiotelephone apparatus*

ITU Radio Regulations: 1995, *Appendix S3: Table of maximum permitted spurious emissions power levels*

ITU Radio Regulations: 1990, *Appendix 18: Table of transmitting frequencies in the band 156 – 174 MHz for stations in the maritime mobile service*

ITU-R M.489-2: 1995, *Technical characteristics of radiotelephone equipment operating in the maritime mobile service in channels spaced by 25 kHz*

ITU-R M.542-1: 1982, *On-board communications by means of portable radiotelephone equipment*

**1 Scope**

This part of IEC 1097 specifies the minimum performance requirements, technical characteristics and methods of testing with required test results of survival craft portable two-way radiotelephone apparatus as required by chapter III of the 1988 amendments to the 1974 International Convention for the Safety of Life at Sea (SOLAS), and which is associated with IEC 945. Where a requirement in this standard is different from IEC 945, the requirement in this

### 3 Performance requirements

#### 3.1 Introduction

Performance requirements described in this clause are specified by referring to IMO Resolutions and ITU Recommendations. In addition to meeting performance requirements in this clause, the equipment shall comply with the technical characteristics contained in clause 4 of this standard.

#### 3.2 General

3.2.1 (A.809(19) 1/2.1) *The equipment shall be portable and capable of being used for on-scene communication between survival craft, between survival craft and ship and between survival craft and rescue unit. It may also be used for on-board communications when capable of operating on appropriate frequencies.*

3.2.2 (A.809(19) 1/2.3) *The equipment shall:*

- 1) *be capable of being operated by unskilled personnel;*
- 2) *be capable of being operated by personnel wearing gloves as specified for immersion suits in regulation 33 of chapter II of the SOLAS 1974 Convention;*
- 3) *be capable of single-handed operation except for channel selection;*
- 9) *be of small size and light weight;*
- 10) *be capable of operating in the ambient noise level likely to be encountered on board ships or survival craft;*
- 11) *have provisions for its attachment to the clothing of the user, including the immersion suit; and*
- 12) *be resistant to deterioration by prolonged exposure to sunlight.*

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3.2.3 (A.809(19) 1/2.3.13) *The equipment shall be either of a highly visible yellow/orange colour or marked with a surrounding yellow/orange marking strip.*

#### 3.3 General requirements

##### 3.3.1 Composition

(A.809(19) 1/2.2) *The equipment shall comprise at least:*

- 1) *an integral transmitter/receiver including antenna and battery;*
- 2) *an integral control unit including a press-to-transmit switch;*
- 3) *an internal microphone and loudspeaker.*

##### 3.3.2 Controls and indicators

3.3.2.1 (A.809(19) 1/4.1) *An on/off switch shall be provided with positive visual indication that the radiotelephone is switched on.*

3.3.2.2 (A.809(19) 1/4.2) *The receiver shall be provided with a manual volume control by which the audio output may be varied.*

3.3.2.3 (A.809(19) 1/4.3) *A squelch (mute) control and channel selection switch shall be provided.*

3.3.2.4 (A.809(19) 1/4.4) *Channel selection shall be easily performed and the channels shall be clearly discernible.*

3.3.2.5 (A.809(19) 1/4.5) *Channel indication shall be in accordance with appendix 18 of the Radio Regulations.*



*It shall be possible to determine that channel 16 has been selected in all ambient light conditions.*

### 3.3.3 Antenna

(A.809(19) 1/9) *The antenna shall be vertically polarized and, as far as practicable, be omnidirectional in the horizontal plane. The antenna shall be suitable for efficient radiation and reception of signals at the operating frequency.*

### 3.3.4 Safety precautions

3.3.4.1 (A.809(19) 1/6) *The equipment shall not be damaged by the effect of open-circuiting or short-circuiting the antenna.*

3.3.4.2 (A.809(19) 1/2.3.8) *The equipment shall have no sharp projections which could damage survival craft.*

### 3.3.5 Frequency bands and channels

3.3.5.1 (A.809(19) 1/3.1) *The two-way radiotelephone shall be capable of operation on the frequency 156,800 MHz (VHF CH 16) and on at least one additional channel.*

3.3.5.2 (A.809(19) 1/3.2) *All channels fitted shall be for single-frequency voice communication only.*

3.3.5.3 (A.809(19) 1/3.3) *The class of emission shall be G3E to comply with appendix 19 of the Radio Regulations.*

### 3.3.6 Marking and identification

(A.809(19) 1/13) *In addition to the items specified in resolution A.694(17) on general requirements, as detailed in IEC 945, the following shall be clearly indicated on the exterior of the equipment:*

- 1) *brief operating instructions;*
- 2) *expiry date for the primary batteries.*

### 3.3.7 Warming-up period

(A.809(19) 1/5) *The equipment shall be operational within 5 s of switching on.*

### 3.3.8 Power supply

3.3.8.1 (A.809(19) 1/12.1) *The source of energy shall be integrated in the equipment and may be replaceable by the user. In addition, provision may be made to operate the equipment using an external source of electrical energy.*

3.3.8.2 (A.809(19) 1/12.2) *Equipment intended for the source of energy to be user replaceable shall be provided with a dedicated primary battery for use in the event of a distress situation. This battery shall be equipped with a non-replaceable seal to indicate that it has not been used.*

3.3.8.3 (A.809(19) 1/12.3) *Equipment intended for the source of energy to be non-user-replaceable shall be provided with a primary battery. The portable two-way radiotelephone equipment shall be equipped with a non-replaceable seal to indicate that it has not been used.*

3.3.8.4 (A.809(19) 1/12.4) *The primary battery shall have sufficient capacity to ensure 8 h operation at its highest rated power with a duty cycle of 1: 9. The duty cycle is defined as 6 s transmission, 6 s reception above squelch opening level and 48 s reception below squelch opening level.*

3.3.2.6 (A.809(19) 1/4.6)

3.3.8.5 (A.809(19) 1/12.5) *Primary batteries shall have a shelf life of at least 2 years and if intended to be user replaceable shall be of a colour or marking as defined in 3.2.3.*

3.3.8.6 (A.809(19) 1/12.6) *Primary or secondary batteries not intended for the use in the event of a distress situation shall be of a colour or marking so that they cannot be confused with batteries intended for such use.*

#### 3.4 Environmental requirements

3.4.1 (A.809(19) 1/11) *The equipment shall be so designed as to operate over the temperature range  $-20\text{ }^{\circ}\text{C}$  to  $+55\text{ }^{\circ}\text{C}$ . It shall not be damaged in stowage throughout the temperature range  $-30\text{ }^{\circ}\text{C}$  to  $+70\text{ }^{\circ}\text{C}$ .*

3.4.2 (A.809(19) 1/2.3.4) *The equipment shall withstand drops on to a hard surface from a height of 1 m.*

3.4.3 (A.809(19) 1/2.3.5) *The equipment shall be watertight to a depth of 1 m for at least 5 min.*

3.4.4 (A.809(19) 1/2.3.6) *The equipment shall maintain watertightness when subjected to a thermal shock of  $45\text{ }^{\circ}\text{C}$  under conditions of immersion.*

3.4.5 (A.809(19) 1/2.3.7) *The equipment shall not be unduly affected by seawater or oil or both.*

#### 3.5 Electromagnetic compatibility

The equipment shall comply with the EMC requirements specified in resolution A.694(17), as detailed in IEC 945.

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### 4 Technical characteristics

IEC 61097-12:1996

4.1 *General* <https://standards.iteh.ai/catalog/standards/sist/075f5ddd-f09c-4512-bd08-a9291ccc5e22/iec-61097-12-1996>

The equipment shall be designed to operate satisfactorily with a channel separation of 25 kHz in accordance with appendix 18 of the Radio Regulations.

#### 4.2 Class of emission and modulation characteristics

4.2.1 (M.489-2/1.1.1 and .3) *The class of emission shall be G3E (frequency modulation with a pre-emphasis characteristic of 6 dB/Octave).*

4.2.2 (M.489-2/1.1.2) *The necessary bandwidth shall be 16 kHz.*

#### 4.3 Transmitter

4.3.1 (M.489-2/1.2.1) *The frequency tolerance for ship station transmitters shall not exceed 10 parts in  $10^6$ . For practical reasons, the frequency error shall be within  $\pm 1,5\text{ kHz}$ .*

4.3.2 (A.809(19) 1/7) *The effective radiated power shall be a minimum of 0,25 W. Where the effective radiated power exceeds 1 W, a power reduction switch to reduce the power to 1 W or less is required. When this equipment provides for on-board communications, the output power shall not exceed 1 W on these frequencies.*

4.3.3 *The frequency deviation corresponding to 100% modulation shall approach  $\pm 5\text{ kHz}$  as nearly as practicable.*

4.3.4 (M.489-2/1.2.5) *The upper limit of the audiofrequency band shall not exceed 3 kHz.*

*Spurious emissions on discrete frequencies, when measured in a non-reactive load equal to the nominal output impedance of the transmitter shall be in accordance with the provisions of Appendix 8 of the Radio Regulations. The power of any conducted spurious emission on any discrete frequency shall not exceed 0,25  $\mu$ W.*

4.3.6 (M.489-2/1.2.6) *The cabinet radiated power shall not exceed 25  $\mu$ W. In some radio environments, lower values may be required. The equipment shall meet the requirements of IEC 945 for radiated interference.*

#### 4.4 Receiver

4.4.1 (A.809(19) 1/8.1) *The sensitivity of the receiver shall be equal to or better than 2  $\mu$ V e.m.f. for a SINAD ratio of 12 dB at the output.*

4.4.2 (A.809(19) 1/8.2) *The immunity to interference of the receiver shall be such that the wanted signal is not seriously affected by unwanted signals.*

4.4.3 (A.809(19)1/10.1) *The audio output shall be sufficient to be heard in the ambient noise level likely to be encountered on board ships or in a survival craft.*

4.4.4 (A.809(19) 1/10.2) *In the transmit condition the output of the receiver shall be muted.*

4.4.5 (M.489-2/1.3.2) *The adjacent channel selectivity shall be at least 70 dB.*

4.4.6 (M.489-2/1.3.3) *The spurious response rejection ratio shall be at least 70 dB.*

4.4.7 (M.489-2/1.3.4) *The radio frequency intermodulation response ratio shall be at least 65 dB.*

4.4.8 (M.489-2/1.3.5) *The power of any conducted spurious emission measured at the antenna terminals shall not exceed 2,0 nW at any discrete frequency.*

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## 5 Methods of testing and required test results

Environmental tests shall be carried out before tests to verify whether the equipment under test (EUT) meets all technical requirements. Where electrical tests are required, these shall be done using the normal test voltage as specified in IEC 945 unless otherwise stated.

In each test item indicated below, the related requirement can be identified by referring to the text with subclause number in brackets.

### 5.1 Test conditions

For field measurements and performance checks to this standard, the EUT shall be operational on channel 17.

#### 5.1.1 Normal and extreme test conditions

Tests shall be made under normal test conditions and also, where stated, under extreme test conditions as specified in IEC 945, of dry heat and the upper limit of supply voltage applied simultaneously and low temperature and the lower limit of supply voltage applied simultaneously.

#### 5.1.2 Test power source

During each test the EUT shall be supplied from a test power source, capable of producing normal and extreme test voltages. For the purpose of tests, the voltage of the power source shall be measured at the input terminals of the EUT. During tests, the power supply voltages shall be maintained within  $\pm 3$  % relative to the voltage level at the beginning of each test.

4.3.5 (M.489-2/1.2.2)

The test power source shall only be used in measurements where the use of the test power source is mutually agreed between manufacturer and test house. In the event of any discrepancy, results obtained using the batteries shall take precedence over results obtained using the test power source.

### 5.1.3 Procedure for tests at extreme temperatures

For tests at low temperature, the EUT shall be placed in the test chamber and left until thermal equilibrium is reached and shall then be switched to stand-by or receive position for 5 s after which the EUT shall meet the requirements of this standard.

### 5.1.4 Performance check

#### 5.1.4.1 Definition

The performance check means a shortened form of the test required by the relevant standard under normal test conditions, such as could normally be carried out in no more than 15 min.

#### 5.1.4.2 Method of measurement

After each environmental test a performance check shall be made, which shall include the following:

- the transmitter frequency error to 5.4.1.2 and the output power of the transmitter to 5.4.3.2 (high power only); and
- the receiver maximum usable sensitivity to 5.5.3.2.

#### 5.1.4.3 Results required

The frequency error shall be less than  $\pm 1,5$  kHz, the carrier power shall be not less than 0,25 W and the receiver sensitivity shall be better than 12 dB $\mu$ V.

### 5.1.5 Environmental tests

Environmental tests are intended to assess the suitability of the construction of the EUT for its intended physical conditions of use. After environmental tests, and, if specified also during the test, the EUT shall comply with the requirements of a performance check.

Environmental tests shall be carried out before any other tests. Where electrical tests are required, these shall be done with the normal test voltage unless otherwise stated.

Environmental tests shall be carried out in the following order.

#### 5.1.5.1 Drop test

This test simulates the effects of a free fall of the EUT onto the deck of a ship resulting from mishandling.

The drop test shall be performed as specified in IEC 945.

During the test the equipment shall be fitted with a suitable set of batteries and its antenna, but it shall be switched off.

At the end of the test the EUT shall be subjected to a performance check and shall then be examined for damage. The findings shall be noted in the test report.

### *Thermal shock*

This test determines the ability of the EUT to function correctly after sudden immersion in water from storage at high temperature.

The EUT shall be placed in an atmosphere of  $+65\text{ °C} \pm 3\text{ °C}$  for 1 h. It shall then be immersed in water at  $+20\text{ °C} \pm 3\text{ °C}$  to a depth of  $100\text{ mm} \pm 5\text{ mm}$ , measured from the highest point of the equipment to the surface of the water, for a period of 1 h.

At the end of the test the EUT shall be subjected to a performance check and shall then be examined for damage and for unwanted ingress of water. The findings shall be noted in the test report.

Following the examination, the EUT shall be resealed in accordance with manufacturer's instructions. Alternatively, if there are no external signs of unwanted ingress of water, an internal examination of the EUT which involves disturbance to seals may be carried out after all environmental tests have been completed.

#### *5.1.5.3 Immersion test*

This test simulates the effects of water pressure on the EUT which although not designed to float may experience a temporary immersion in water.

The EUT shall be subjected to the test corresponding to IEC 529, table II, second characteristic numeral 7. The test shall be carried out by completely immersing the EUT in water so that the following conditions are satisfied:

- the highest point of the EUT is located 1 m below the surface of the water;
- the duration of the test is 5 min; and
- the water temperature does not differ from that of the equipment by more than  $5\text{ °C}$ .

At the end of the test the EUT shall be subjected to a performance check and shall then be examined for damage and for unwanted ingress of water. The findings shall be noted in the test report.

Following the examination, the EUT shall be resealed in accordance with manufacturer's instructions. Alternatively, if there are no external signs of unwanted ingress of water, an internal examination of the EUT which involves disturbance to seals may be carried out after all environmental tests have been completed.

#### *5.1.5.4 Dry heat cycle*

The dry heat cycle test shall be performed as specified in IEC 945.

#### *5.1.5.5 Damp heat cycle*

The damp heat cycle test shall be performed as specified in IEC 945.

#### *5.1.5.6 Low temperature cycle*

The low temperature cycle test shall be performed as specified in IEC 945.

#### *5.1.5.7 Vibration*

The vibration test shall be performed as specified in IEC 945.