

Draft **ETSI EN 301 466** V1.2.0 (2015-08)



**Technical characteristics and methods of measurement  
for two-way VHF radiotelephone apparatus  
for fixed installation in survival craft**

*ITeH STANDARD PREVIEW  
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**Reference**

REN/ERM-TG26-516

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**Keywords**

emergency, GMDSS, maritime, radio, VHF

**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
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## Foreword

This draft European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

<b>Proposed national transposition dates</b>	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

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## Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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# 1 Scope

The present document states the minimum technical characteristics required for VHF radiotelephone equipment, operating in the bands between 156 MHz and 174 MHz allocated to the Maritime Mobile Services and suitable for fixed installations in survival craft in accordance with the provisions of the Global Maritime Distress and Safety System (GMDSS). The relevant requirements detailed in the Radio Regulations [5], International Convention for the Safety Of Life At Sea SOLAS 1974 [4] and the International Maritime Organization Resolutions A.694 [i.3] and A.809 [i.2] as well as all relevant requirements of EN 60945 [i.5] are incorporated in the present document.

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## 2 References

### 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

- [1] Recommendation ITU-T O.41 (1994): "Psophometer for use on telephone-type circuits".
- [2] IEC 60068-2-27: 2008 Edition 4.0 "Environmental testing. Part 2: Tests - Test Ea and guidance: Shock".
- [3] ISO 25862 (2009): "Ships and marine technology-- Marine magnetic compasses, binnacles and azimuth reading devices".
- [4] SOLAS 1974: "International Maritime Organization (IMO), International Convention for the Safety Of Life At Sea (SOLAS), (1974 as amended)".
- [5] ITU Radio Regulations (2012), Appendix 18: "Table of transmitting frequencies in the VHF maritime mobile band".
- [6] ETSI TS 103 052: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Radiated measurement methods and general arrangements for test sites up to 100 GHz".

### 2.2 Informative references

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] Void.
- [i.2] International Maritime Organization Resolution A.809 (19): "Performance standards for survival craft two way VHF radiotelephone apparatus".
- [i.3] International Maritime Organization 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".



- [i.4] Void.
- [i.5] CENELEC EN 60945 (2002) + Corrigendum 1 (2008): "Maritime navigation and radio communication equipment and systems - General requirements - Methods of testing and required test results".
- [i.6] ETSI TR 100 028 (All parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

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## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**modulation index:** ratio of the frequency deviation to the modulation frequency

**primary battery:** non rechargeable battery which may be user replaceable

NOTE: See International Maritime Organization Resolution A.809(19) [i.2].

**rated output power:** output power as defined by the manufacturer

**secondary battery:** rechargeable battery

NOTE: See International Maritime Organization Resolution A.809(19) [i.2].

### 3.2 Symbols

For the purposes of the present document, the following symbols apply:

dBA	Acoustic level in dB relative to $2 \times 10^{-5}$ Pascal
g	Acceleration of gravity ( $\approx 9,81$ m/s <sup>2</sup> )
G3E	Phase modulation for voice
Q	Ratio of an observed acceleration at the equipment to the acceleration at the base of the vibration table

### 3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ad	amplitude difference
DSC	Digital Selective Calling
emf	electro-motive force
ERP	Effective Radiated Power
EUT	Equipment Under Test
fd	frequency difference
GMDSS	Global Maritime Distress and Safety System
IF	Intermediate Frequency
RF	Radio Frequency
rms	root mean square
SINAD	(Signal + Noise + Distortion)/(Noise + Distortion) ratio
SOLAS	International Convention for the Safety of Life at Sea
VHF	Very High Frequency

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## 4 General requirements

### 4.1 Construction

The equipment shall be capable of being used for on-scene communications between survival craft, between survival craft and ship and between survival craft and rescue unit.

The equipment shall comprise at least:

- a transmitter and receiver;
- an antenna which may be fixed to the equipment or mounted separately; and
- a microphone with press-to-talk switch and a loudspeaker.

The equipment shall be fitted with an external 50  $\Omega$  antenna connector.

The equipment may be operated from an external or integrated power source. An integrated power source may consist of primary or secondary batteries.

The mechanical and electrical construction and finish of the equipment shall conform in all respects to good engineering practice and the equipment shall be suitable for use in survival craft at sea.

All controls shall be of sufficient size to enable the usual control functions to be easily performed by a user wearing gloves for immersion suits, in accordance with SOLAS 1974 [4] Chapter III, Regulation 33. The number of controls should be the minimum necessary for simple and satisfactory operation.

Any parts of the equipment required to be checked during inspection or maintenance operations as laid down by the manufacturer, shall be readily accessible. Components shall be readily identifiable.

For the purpose of conformance testing in accordance with the present document, adequate technical and operational documentation shall be supplied with the equipment.

## 4.2 Frequencies and power

The equipment shall operate only on single-frequency channels for voice communications with manual control (simplex).

The equipment shall provide for transmission and reception of signals on channel 16 and at least one other single frequency channel from those specified in Appendix 18 of the Radio Regulations [5], (with the exception of the DSC calling channel 70 and AIS1 and AIS2).

NOTE: Preference shall be given to simplex channels where analogue voice is the priority mode.

Independent selection of transmitting and receiving frequencies shall not be possible.

After switch on the equipment shall be operational within 5 seconds.

It shall not be possible to transmit during channel switching operations.

## 4.3 Controls

The equipment shall have a channel selector and shall indicate the designator of the channel at which the equipment is set, as given in Appendix 18 of the Radio Regulations [5].

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

The equipment shall have the following additional controls:

- on/off switch for the equipment with a visual indication that the equipment is switched on;
- a manual non-locking push to talk switch to operate the transmitter;
- if the transmitter ERP is greater than 1 watt, a switch for reducing the power to a level not exceeding 1 watt ERP;
- an audio-frequency volume control;
- a squelch control;
- a carrier power detector giving a visual indication that the carrier is being produced.

The user shall not have access to any control which may impair the technical characteristics of the equipment if wrongly set.

## 4.4 Switching time

The channel switching arrangements shall be such that the time necessary to change over from using one of the channels to using any other channel does not exceed 5 seconds.

The time necessary to change over from transmission to reception and vice versa, shall not exceed 0,3 seconds.

## 4.5 Safety precautions

Means shall be incorporated to prevent damage to the equipment due to reversal of polarity of the battery power supply.

The equipment shall be designed to be free of sharp projections which could damage survival craft.

The equipment shall not be damaged by the effects of an open circuit or a short circuit of the antenna.

## 4.6 Class of emission and modulation characteristics

The equipment shall use phase modulation, G3E (frequency modulation with a pre-emphasis of 6 dB/octave) for speech.

The equipment shall be designed to operate satisfactorily to the requirements of the present document with a channel separation of 25 kHz.

## 4.7 Power supply

### 4.7.1 Power supply capacity

The capacity of the power supply shall be sufficient to operate the equipment continuously for at least eight hours at any temperature condition (see clauses 5.3.1 and 5.4.1) with a 1 : 9 transmit to receive duty cycle at the highest rated transmit power.

This duty cycle is defined as:

- 6 s transmit at full RF output power without modulation, 6 s reception with an RF input signal at the nominal frequency of the receiver at a level of +60 dB $\mu$ V using normal test modulation (clause 6.4); and
- the audio volume control of the receiver set at maximum followed by 48 s reception without input signal and the squelch control operational (muted).

### 4.7.2 Primary batteries

Primary batteries used as internal or external power supply shall have a shelf life of at least two years.

Provisions shall be made for replacing any battery easily without the use of special tools and without degrading the performance of the equipment (particularly water tightness after re-assembly).

### 4.7.3 Secondary batteries

Secondary batteries used as internal or external power supply shall be provided with a suitable charger as defined in clause 10.

Provisions shall be made for replacing any battery easily without the use of special tools and without degrading the performance of the equipment (particularly water tightness after re-assembly).

### 4.7.4 Connection to a survival craft battery

Where equipment is intended for connection to the on board battery of a survival craft the manufacturer shall declare the power requirements of the transceiver in A/h and the nominal voltage. This shall be detailed in the installation instructions.

The supplied data shall be verified by a check of current drawn in transmit and receive modes and the resultant equivalent for the duty cycle as defined in clause 4.7.1 shall be calculated and shall not exceed the figure declared.

## 4.8 Labelling

All controls and indicators shall be clearly labelled.

The equipment shall be clearly labelled with brief instructions for operation.

The equipment shall be clearly marked on the exterior with identification of the manufacturer, type designation and serial number.

The compass safe distance measured in accordance with ISO 25862 [3], shall be stated on the equipment or in the user document supplied with the equipment.

The type and designation of any integrated battery used, and the expiry date of any primary battery shall be clearly labelled.

Details of the power supply from which the equipment is intended to operate shall be clearly indicated on the equipment.

## 4.9 Audio processing

The equipment may be designed with an audio processing system for best perceived sound quality in the built-in speaker system.

It shall be possible to disable audio processing and it shall be clearly indicated whether audio processing is turned on or off. The best audio quality settings shall be provided automatically after power-on.

If audio processing is applied to the microphone input, the testing shall be performed with the processing enabled.

Audio processing may be applied to audio outputs for handset, external speaker, etc., but shall not affect line level audio interfaces.

The overall acoustic design shall be optimized for perceived speech recognition for communication and shall be designed in accordance with clause 4.1.

Where audio processing is activated it shall be assessed the acoustic speech recognition is equal to, or better than without audio processing enabled under receive conditions at sensitivity level.

Under receive conditions below sensitivity level, the acoustic speech recognition shall never be significantly decreased by enabling of audio processing.

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# 5 Test conditions, power sources and ambient temperatures

## 5.1 Normal and extreme test conditions

Conformance testing shall be made under normal test conditions and also, where stated, under extreme test conditions.

## 5.2 Test power source

During conformance testing, the equipment shall be supplied from a test power source capable of producing normal and extreme test voltages as specified in clauses 5.3.2 and 5.4.2. The test power source shall only be used in measurements where its effect on the test results shall be negligible. For the purpose of testing the power source voltage shall be measured at the input terminals of the equipment.

During testing, the power source voltages shall be maintained within a tolerance of  $\pm 3$  % relative to the voltage level at the beginning of each test.