



# SLOVENSKI STANDARD

## SIST EN 301 466 V1.2.1:2016

01-marec-2016

---

**Tehnične karakteristike in merilne metode za radiotelefonske naprave VHF, ki so trajno vgrajene na rešilnih čolnih**

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

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

Ta slovenski standard je istoveten z: **EN 301 466 V1.2.1**  
<https://standards.iteh.ai/catalog/standards/sist/91611080-4a55-4844-900e-66262d5eede1/sist-en-301-466-v1-2-1-2016>

**ICS:**

33.060.20	Sprejemna in oddajna oprema	Receiving and transmitting equipment
47.020.70	Navigacijska in krmilna oprema	Navigation and control equipment

**SIST EN 301 466 V1.2.1:2016**

**en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 301 466 V1.2.1:2016

<https://standards.iteh.ai/catalog/standards/sist/9f61f080-4a55-4844-900e-66262d5eede1/sist-en-301-466-v1-2-1-2016>

# ETSI EN 301 466 V1.2.1 (2015-12)



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

[SIST EN 301 466 V1.2.1:2016](https://standards.iteh.ai/catalog/standards/sist/9f61f080-4a55-4844-900e-66262d5eede1/sist-en-301-466-v1-2-1-2016)

<https://standards.iteh.ai/catalog/standards/sist/9f61f080-4a55-4844-900e-66262d5eede1/sist-en-301-466-v1-2-1-2016>

---

Reference

REN/ERM-TG26-516

---

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  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 301 466 V1.2.1:2016

<https://standards.iteh.ai/catalog/standards/sist/9f61f080-4a55-4844-900e-66262d5e6d3d/en-301-466-v1-2-1-2016>  
**Important notice**

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

---

**Copyright Notification**

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2015.

All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.  
**GSM®** and the GSM logo are Trade Marks registered and owned by the GSM Association.

# Contents

Intellectual Property Rights .....	7
Foreword.....	7
Modal verbs terminology.....	7
1 Scope .....	8
2 References .....	8
2.1 Normative references .....	8
2.2 Informative references.....	8
3 Definitions, symbols and abbreviations .....	9
3.1 Definitions.....	9
3.2 Symbols.....	9
3.3 Abbreviations .....	9
4 General requirements .....	10
4.1 Construction .....	10
4.2 Frequencies and power.....	10
4.3 Controls .....	10
4.4 Switching time.....	11
4.5 Safety precautions .....	11
4.6 Class of emission and modulation characteristics .....	11
4.7 Power supply .....	11
4.7.1 Power supply capacity.....	11
4.7.2 Primary batteries.....	11
4.7.3 Secondary batteries.....	12
4.7.4 Connection to a survival craft battery .....	12
4.8 Labelling.....	12
4.9 Audio processing.....	12
5 Test conditions, power sources and ambient temperatures .....	13
5.1 Normal and extreme test conditions .....	13
5.2 Test power source.....	13
5.3 Normal test conditions.....	13
5.3.1 Normal temperature and humidity .....	13
5.3.2 Normal power sources .....	13
5.3.2.1 External battery power source.....	13
5.3.2.2 Integrated battery power source .....	13
5.4 Extreme test conditions .....	13
5.4.1 Extreme temperatures .....	13
5.4.1.1 Upper extreme temperature.....	13
5.4.1.2 Lower extreme temperature .....	13
5.4.2 Extreme test power supply values.....	14
5.4.2.1 Upper extreme test voltage.....	14
5.4.2.1.1 External battery power source .....	14
5.4.2.1.2 Internal battery power source .....	14
5.4.2.2 Lower extreme test voltage .....	14
5.4.2.2.1 External battery power source .....	14
5.4.2.2.2 Internal battery power source .....	14
5.5 Procedure for tests at extreme temperatures.....	14
6 General conditions of measurement .....	14
6.1 Test connections .....	14
6.2 Arrangements for test signals applied to the receiver input.....	15
6.3 Receiver mute or squelch facility.....	15
6.4 Normal test modulation .....	15
6.5 Artificial antenna.....	15
6.6 Test channels .....	15
6.7 Measurement uncertainty and interpretation of the measuring results .....	15
6.7.1 Measurement uncertainty.....	15

6.7.2	Interpretation of the measurement results .....	16
7	Environmental tests .....	16
7.1	Introduction .....	16
7.2	Procedure.....	16
7.3	Performance check .....	16
7.4	Vibration test.....	16
7.4.1	Definition.....	16
7.4.2	Method of measurement .....	17
7.4.3	Requirement.....	17
7.5	Shock tests.....	17
7.5.1	Definition.....	17
7.5.2	Method of measurement .....	17
7.5.3	Requirement.....	17
7.6	Temperature tests .....	18
7.6.1	General.....	18
7.6.2	Dry heat cycle .....	18
7.6.2.1	Method of measurement.....	18
7.6.2.2	Requirement .....	18
7.6.3	Damp heat cycle .....	18
7.6.3.1	Method of measurement.....	18
7.6.3.2	Requirement .....	18
7.6.4	Low temperature cycle.....	19
7.6.4.1	Method of measurement.....	19
7.6.4.2	Requirement .....	19
7.7	Corrosion test .....	19
7.7.1	General.....	19
7.7.2	Method of measurement .....	19
7.7.3	Requirements .....	20
7.8	Immersion test .....	20
7.8.1	Method of measurement .....	20
7.8.2	Requirements .....	20
7.9	Thermal shock .....	20
7.9.1	Method of measurement .....	20
7.9.2	Requirements .....	20
7.10	Oil resistance test.....	20
7.10.0	Applicability .....	20
7.10.1	Method of measurement .....	21
7.10.2	Requirement.....	21
8	Transmitter .....	21
8.0	General .....	21
8.1	Frequency error .....	21
8.1.1	Definition.....	21
8.1.2	Method of measurement .....	21
8.1.3	Limit .....	21
8.2	Carrier power.....	21
8.2.1	Definitions .....	21
8.2.2	Method of measurement .....	22
8.2.3	Limits.....	22
8.3	Frequency deviation .....	22
8.3.1	Definition.....	22
8.3.2	Maximum frequency deviation.....	22
8.3.2.1	Method of measurement.....	22
8.3.2.2	Limit.....	22
8.3.3	Reduction of frequency deviation at modulation frequencies above 3 kHz.....	22
8.3.3.1	Method of measurement.....	22
8.3.3.2	Limits .....	22
8.4	Sensitivity of the modulator, including microphone .....	23
8.4.1	Definition.....	23
8.4.2	Method of measurement .....	23
8.4.3	Limit .....	23

8.5	Audio frequency response .....	23
8.5.1	Definition .....	23
8.5.2	Method of measurement .....	23
8.5.3	Limit .....	23
8.6	Audio frequency harmonic distortion of the emission.....	24
8.6.1	Definition.....	24
8.6.2	Method of measurement .....	24
8.6.2.1	Normal test conditions .....	24
8.6.2.2	Extreme test conditions .....	24
8.6.3	Limit .....	24
8.7	Adjacent channel power .....	24
8.7.1	Definition.....	24
8.7.2	Method of measurement .....	24
8.7.3	Limit .....	25
8.8	Conducted spurious emissions conveyed to the antenna .....	25
8.8.1	Definition.....	25
8.8.2	Method of measurement .....	25
8.8.3	Limit .....	25
8.9	Cabinet radiation and conducted spurious emissions other than those conveyed to the antenna .....	25
8.9.1	Definitions .....	25
8.9.2	Method of measurement .....	25
8.9.3	Limits.....	26
8.10	Residual modulation of the transmitter .....	26
8.10.1	Definition.....	26
8.10.2	Method of measurement .....	26
8.10.3	Limit .....	27
8.11	Transient frequency behaviour of the transmitter.....	27
8.11.1	Definitions .....	27
8.11.2	Method of measurement .....	27
8.11.3	Limits.....	28
9	Receiver.....	30
9.1	Harmonic distortion and rated audio frequency output power.....	30
9.1.1	Definition.....	30
9.1.2	Methods of measurement.....	30
9.1.3	Limits.....	30
9.2	Audio frequency response .....	30
9.2.1	Definition.....	30
9.2.2	Method of measurement .....	30
9.2.3	Limits.....	31
9.3	Maximum usable sensitivity.....	31
9.3.1	Definition.....	31
9.3.2	Method of measurement .....	31
9.3.3	Limits.....	32
9.4	Co-channel rejection.....	32
9.4.1	Definition.....	32
9.4.2	Method of measurement .....	32
9.4.3	Limit .....	32
9.5	Adjacent channel selectivity.....	32
9.5.1	Definition.....	32
9.5.2	Method of measurement .....	32
9.5.3	Limits.....	33
9.6	Spurious response rejection.....	33
9.6.1	Definition.....	33
9.6.2	Method of measurement .....	33
9.6.3	Limit .....	33
9.7	Intermodulation response .....	33
9.7.1	Definition.....	33
9.7.2	Method of measurement .....	33
9.7.3	Limit .....	34
9.8	Blocking or desensitization .....	34
9.8.1	Definition.....	34

9.8.2	Method of measurement .....	34
9.8.3	Limit .....	34
9.9	Conducted spurious emissions .....	34
9.9.1	Definition.....	34
9.9.2	Method of measurement .....	34
9.9.3	Limit .....	34
9.10	Radiated spurious emissions.....	35
9.10.1	Definition.....	35
9.10.2	Method of measurements.....	35
9.10.3	Limit .....	35
9.11	Amplitude response of the receiver limiter .....	36
9.11.1	Definition.....	36
9.11.2	Method of measurement .....	36
9.11.3	Limit .....	36
9.12	Receiver noise .....	36
9.12.1	Definition.....	36
9.12.2	Method of measurement .....	36
9.12.3	Limit .....	36
9.13	Squelch operation.....	36
9.13.1	Definition.....	36
9.13.2	Method of measurement .....	36
9.13.3	Limits.....	37
9.14	Squelch hysteresis .....	37
9.14.1	Definition.....	37
9.14.2	Method of measurement .....	37
9.14.3	Limit .....	37
10	Secondary battery charger.....	37
10.1	General .....	37
10.2	Environmental tests .....	38
10.2.1	Introduction.....	38
10.2.2	Vibration test .....	38
10.2.2.1	Definition.....	38
10.2.2.2	Method of measurement.....	38
10.2.2.3	Requirement .....	38
10.2.3	Shock tests .....	38
10.2.3.1	Definition .....	38
10.2.3.2	Method of measurement.....	38
10.2.3.3	Requirement .....	39
10.2.4	Temperature tests .....	39
10.2.4.1	General .....	39
10.2.4.2	Dry heat cycle .....	39
10.2.4.3	Damp heat cycle.....	39
10.2.4.4	Low temperature cycle.....	39
10.2.5	Corrosion test.....	40
10.2.5.1	General .....	40
10.2.5.2	Method of measurement.....	40
10.2.5.3	Requirements .....	40
10.3	Charging time .....	40
<b>Annex A (normative): Measuring receiver for adjacent channel power measurement.....</b>		<b>41</b>
A.1	Power measuring receiver specification.....	41
A.1.0	Description .....	41
A.1.1	IF filter .....	41
A.1.2	Attenuation indicator.....	42
A.1.3	rms value indicator .....	42
A.1.4	Oscillator and amplifier.....	42
History .....		43



---

## Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

---

## Foreword

This European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

National transposition dates	
Date of adoption of this EN:	7 December 2015
Date of latest announcement of this EN (doa):	31 March 2016
Date of latest publication of new National Standard or endorsement of this EN (dope):	30 September 2016
Date of withdrawal of any conflicting National Standard (dow):	30 September 2017

---

## 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).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

# 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 CENELEC EN 60945 [i.5] are incorporated in the present document.

## 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 2-27: 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

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.

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 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".

## 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 ( $\approx 9.81 \text{ m/s}^2$ )
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

## 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).