



**VHF transmitters and receivers as Coast Stations for GMDSS
and other applications in the maritime mobile service;
Harmonised Standard covering the essential requirements
of article 3.2 of Directive 2014/53/EU**

iTeh STANDARD REVIEW
Full standard
4604-a13c-2f4962b4867/etsi-en-301-929-v2.1.1-2016-03
<https://standards.iteh.ai/catalog/4604-a13c-2f4962b4867/etsi-en-301-929-v2.1.1-2016-03>

Reference

REN/ERM-TG26-140

Keywords

harmonised standard, maritime, radio, VHF

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Contents

Intellectual Property Rights	8
Foreword.....	8
Modal verbs terminology.....	8
1 Scope	9
2 References	9
2.1 Normative references	9
2.2 Informative references.....	10
3 Definitions, symbols and abbreviations	10
3.1 Definitions.....	10
3.2 Symbols.....	10
3.3 Abbreviations	10
4 General requirements	11
4.1 Construction	11
4.2 Controls and indicators.....	11
4.3 Safety precautions	12
4.4 Labelling.....	12
5 Technical requirements	12
5.1 Switching time.....	12
5.2 Class of emission and modulation characteristics	12
5.3 Use of Channel 70	12
5.4 Audio line.....	12
5.5 DSC Controller Interfaces	13
6 General conditions of measurement.....	13
6.1 Arrangements for test signals applied to the receiver input.....	13
6.2 Squelch.....	13
6.3 Normal test modulation.....	13
6.4 Artificial antenna.....	13
6.5 Standard test signals for DSC	13
6.5.1 References to standard test signals	13
6.5.2 Standard test signal	13
6.6 Determination of the symbol error rate in the output of the receiving part	14
6.7 DSC Decoder.....	14
6.8 Test channels	14
6.9 Reference Bandwidths for emissions measurements.....	14
7 Test conditions and power sources.....	15
7.1 Normal and extreme test conditions	15
7.2 Test power source.....	15
7.3 Normal test conditions.....	15
7.3.1 Normal temperature and humidity	15
7.3.2 Normal power sources	15
7.3.2.1 Mains voltage and frequency	15
7.3.2.2 Lead Acid Battery power source.....	15
7.3.2.3 Other power sources.....	15
7.4 Test under extreme test conditions	16
7.4.1 General.....	16
7.4.2 Extreme temperatures	16
7.4.3 Extreme values of test power sources	16
7.4.3.1 Mains voltage	16
7.4.3.2 Battery power source.....	16
7.4.3.3 Other power sources.....	16
7.5 Procedure for tests at extreme temperatures.....	16
8 Transmitter	16

8.1	Frequency Error.....	16
8.1.1	Definition.....	16
8.1.2	Method of measurement	16
8.1.3	Limits.....	17
8.2	Carrier power.....	17
8.2.1	Definitions	17
8.2.2	Method of measurement	17
8.2.3	Limits.....	17
8.2.3.1	Normal test conditions	17
8.2.3.2	Extreme test conditions	17
8.3	Frequency deviation	17
8.3.1	Definition.....	17
8.3.2	Maximum permissible frequency deviation.....	17
8.3.2.1	Method of measurement.....	17
8.3.2.2	Limits	18
8.3.3	Reduction of frequency deviation at modulation frequencies above 3 kHz.....	18
8.3.3.1	Method of measurement.....	18
8.3.3.2	Limits	18
8.4	Audio frequency response	19
8.4.1	Definition.....	19
8.4.2	Method of measurement	19
8.4.3	Limit	20
8.5	Audio frequency harmonic distortion of the emission.....	20
8.5.1	Definition.....	20
8.5.2	Method of measurement	20
8.5.3	Limits.....	20
8.6	Adjacent channel power	21
8.6.1	Definition.....	21
8.6.2	Method of measurement	21
8.6.3	Limit	21
8.7	Conducted spurious emissions conveyed to the antenna	21
8.7.1	Definition.....	21
8.7.2	Method of measurement	22
8.7.3	Limit	22
8.8	Cabinet radiation and conducted spurious emissions other than those conveyed to the antenna	22
8.8.1	Definitions	22
8.8.2	Method of measurement	22
8.8.3	Limits.....	23
8.9	Residual modulation of the transmitter	23
8.9.1	Definition.....	23
8.9.2	Method of measurement	23
8.9.3	Limit	24
8.10	DSC transmitter modulation index	24
8.10.1	Definition.....	24
8.10.2	Method of measurement	24
8.10.3	Limits.....	24
8.11	DSC audio input limitation	24
8.11.1	Definition.....	24
8.11.2	Method of measurement	24
8.11.3	Limit	24
8.12	Modulation attack time.....	25
8.12.1	Definition.....	25
8.12.2	Method of measurement	25
8.12.3	Limit	25
8.13	Transient frequency behaviour of the transmitter.....	26
8.13.1	Definitions	26
8.13.2	Method of measurement	27
8.13.3	Limits.....	29
8.14	Intermodulation attenuation.....	29
8.14.1	Definition.....	29
8.14.2	Method of measurement	29
8.14.3	Limits.....	30

8.15	Testing of generated call sequences	30
8.15.1	Definition.....	30
8.15.2	Method of measurement	30
8.15.3	Requirement.....	30
8.16	Modulation rate for DSC.....	30
8.16.1	Definition.....	30
8.16.2	Method of measurement	31
8.16.3	Limits.....	31
8.17	Frequency error (demodulated DSC signal).....	31
8.17.1	Definition.....	31
8.17.2	Method of measurement	31
8.17.3	Limits.....	31
9	Receiver.....	31
9.1	Harmonic distortion.....	31
9.1.1	Definition.....	31
9.1.2	Method of measurement	31
9.1.2.1	Audio line output	31
9.1.2.2	Under normal test conditions	32
9.1.2.3	Under extreme test conditions	32
9.1.3	Limits.....	32
9.2	Audio frequency response	32
9.2.1	Definition.....	32
9.2.2	Method of measurement	32
9.2.3	Limits.....	32
9.3	Amplitude characteristic of the receiver.....	33
9.3.1	Definition.....	33
9.3.2	Method of measurement	33
9.3.3	Limits.....	33
9.4	Maximum usable sensitivity	34
9.4.1	Definition.....	34
9.4.2	Method of measurement	34
9.4.3	Limits.....	34
9.5	Co-channel rejection.....	34
9.5.1	Definition.....	34
9.5.2	Method of measurement	34
9.5.3	Limits.....	35
9.6	Adjacent channel selectivity.....	35
9.6.1	Definition.....	35
9.6.2	Method of measurement	35
9.6.3	Limits.....	35
9.7	Spurious response.....	35
9.7.1	Definition.....	35
9.7.2	Method of measurement	36
9.7.3	Limit	36
9.8	Intermodulation response	36
9.8.1	Definition.....	36
9.8.2	Method of measurement	36
9.8.3	Limit	36
9.9	Blocking or desensitization	37
9.9.1	Definition.....	37
9.9.2	Method of measurement	37
9.9.3	Limit	37
9.10	Receiver noise and hum level.....	37
9.10.1	Definition.....	37
9.10.2	Method of measurement	37
9.10.3	Limit	37
9.11	Spurious emissions	38
9.11.1	Definition.....	38
9.11.2	Conducted spurious emissions	38
9.11.2.1	Method of measurement.....	38
9.11.2.2	Limit.....	38

9.11.3	Radiated spurious emissions	38
9.11.3.1	Method of measurement.....	38
9.11.3.2	Limit.....	39
9.12	DSC audio output characteristic	39
9.12.1	Definition.....	39
9.12.2	Methods of measurement.....	39
9.12.3	Limit	39
9.13	DSC receiver maximum usable sensitivity	40
9.13.1	Definition.....	40
9.13.2	Method of measurement	40
9.13.3	Limits.....	40
9.14	DSC receiver co-channel rejection	40
9.14.1	Definition.....	40
9.14.2	Method of measurement	40
9.14.3	Limits.....	40
9.15	DSC receiver adjacent channel selectivity	41
9.15.1	Definition.....	41
9.15.2	Method of measurement	41
9.15.3	Limits.....	41
9.16	DSC receiver dynamic range	41
9.16.1	Definition.....	41
9.16.2	Method of measurement	41
9.16.3	Limit	41
9.17	Duplex operation for 25kHz channels	41
9.17.1	Introduction.....	41
9.17.2	Receiver desensitization with simultaneous transmission and reception	42
9.17.2.1	Definition	42
9.17.2.2	Method of measurement.....	42
9.17.2.3	Limits	42
9.17.3	Duplex transceiver internal mixing	42
9.17.3.1	Definition	42
9.17.3.2	Method of measurement.....	42
9.17.3.3	Limits	43
9.18	Verification of correct decoding of various types of DSC calls	43
9.18.1	Definition.....	43
9.18.2	Method of measurement	43
9.18.3	Requirement.....	43
9.19	DSC spurious response and blocking immunity	43
9.19.1	Definition.....	43
9.19.2	Method of measurement	43
9.19.3	Limits	44
9.20	DSC Intermodulation response	44
9.20.1	Definition.....	44
9.20.2	Method of measurement	44
9.20.3	Limits	44
10	Testing for compliance with technical requirements	44
10.1	Environmental conditions for testing	44
10.2	Interpretation of the measurement results	45

Annex A (informative): Relationship between the present document and the essential requirements of Directive 2014/53/EU.....46

Annex B (normative): Measuring receiver for adjacent channel power measurement.....48

B.1	Power measuring receiver specification	48
B.1.0	General	48
B.1.1	IF filter	48
B.1.2	Attenuation indicator	49
B.1.3	rms value indicator	49
B.1.4	Oscillator and amplifier	49

Annex C (informative):	Change history	50
	History	51

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Foreword

This draft Harmonised 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.

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.1] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.2].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Proposed national transposition dates	
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

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 specifies the minimum requirements for transmitters, receivers and transceivers fitted with external antenna connectors, used as coast stations, operating in the VHF band of the maritime mobile service. This includes:

- equipment operating under local or remote control;
- equipment operating on 12,5 kHz or 25 kHz channel spacing;
- equipment capable of analogue speech, Digital Selective Calling (DSC), or both;
- equipment operating in Simplex, Semi-Duplex (Half Duplex) and Duplex modes;
- equipment which may consist of more than one unit;
- equipment which may be single-channel or multi-channel;
- equipment operating on shared radio sites;
- equipment operating in isolation from other radio equipment.

Where the equipment is not intended for DSC operation, only those clauses relevant to non-DSC tests are applicable.

The present document covers the essential requirements of article 3.2 of Directive 2014/53/EU [i.2] under the conditions identified in annex A.

2 References

2.1 Normative references

References are specific, identified by date of publication and/or edition number or version number. Only the cited version applies.

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

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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] Recommendation ITU-R M.493-14 (2015): "Digital selective-calling system for use in the maritime mobile service".
- [3] Recommendation ITU-T V.11/X27 (1996): "Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s".
- [4] Recommendation ITU-R M.1084-5 (2012): "Interim solutions for improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service".
- [5] ETSI TS 103 052 (V1.1.1) (03-2011): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Radiated measurement methods and general arrangements for test sites up to 100 GHz".
- [6] ITU Radio Regulations (2016).

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] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.
- [i.2] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.
- [i.3] ETSI TR 100 028-1 (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1".
- [i.4] ETSI TR 100 028-2 (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

block: to inhibit a function by making it inaccessible from the user interface

G3E: phase-modulation (frequency modulation with a pre-emphasis of 6 dB/octave) for analogue speech

G2B: phase-modulation with digital information, with a sub-carrier for Digital Selective Calling (DSC) operation

modulation index: ratio between the frequency deviation and the modulation frequency

3.2 Symbols

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

Hz Hertz

3.3 Abbreviations

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

ac	alternating current
ad	amplitude difference
CSP	Channel SPacing
dBd	the forward gain of an antenna compared to a half-wave dipole antenna in decibel
dc	direct current
DSC	Digital Selective Calling

EFTA	European Free Trade Area
emf	electromotive force
ERP	Effective Radiated Power
EUT	Equipment Under Test
fd	frequency difference
FM	Frequency Modulation
IF	Intermediate Frequency
MUS	Maximum Useable Sensitivity
RBW	Reference BandWidth
RF	Radio Frequency
rms	root mean square
SINAD	Signal + Noise + Distortion/Noise + Distortion
Tx	transmitter
V	Volt
VHF	Very High Frequency

4 General requirements

4.1 Construction

The mechanical and electrical construction and finish of the equipment shall conform in all respects to good engineering practice.

Technical documentation shall be supplied with the equipment.

The equipment shall be able to operate on appropriate channels defined in appendix 18 to the Radio Regulations [6] noting in particular footnotes m) and e).

Additional VHF channels outside those defined by appendix 18 to the Radio Regulations [6] may also be provided.

If 12,5 kHz channels are implemented in the equipment it shall be in accordance with Annex 4 of Recommendation ITU-R M.1084-5 [4].

Additional VHF channels for maritime use outside those defined by Appendix 18 to the Radio Regulations may also be provided where permitted by relevant administrations. These channels shall be clearly identified for use as relating to the relevant administration(s) and accessed through a positive action(s) for enabling use of these channel(s) but means shall be provided to block any or all of these additional channels if required by the relevant administration(s).

It shall not be possible to transmit while any frequency synthesizer used within the transmitter is out of lock.

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

The equipment shall be equipped with a squelch or mute circuit.

4.2 Controls and indicators

At the operator position from which the coast station is controlled, the following facilities shall be available:

- if the equipment is intended to be used on channel 16, this channel shall be clearly marked and shall be readily accessible;
- if the equipment is intended to be used on channel 70, there shall be a distinctive indication when this channel is in use;
- a visual indication that the installation is in operation;
- where more than one radio channel is available, there shall be a visual indication of the radio channel selected for transmission;
- a manual non-locking push-to-talk switch to operate the transmitter (except on equipment designed to operate on channel 70 only);

- a volume control;
- a visual indication that the transmitter is activated;
- the operator shall not have access to any control which, if wrongly set, might impair the technical characteristics of the equipment;
- when there is more than one control unit, indication of the equipment status (e.g. transmit, busy) shall be given to all control units.

4.3 Safety precautions

Measures shall be taken to protect the equipment against the effects of excessive current and excessive voltage.

Measures shall be taken to prevent damage to the equipment that might arise from an accidental reversal of polarity of the electrical power source.

Means shall be provided for earthing exposed metallic parts of the equipment.

No damage to the equipment shall occur when the antenna terminals are placed on open circuit or short circuit for a period of at least 5 min in each case.

In order to provide protection against damage due to the build-up of static voltages at the antenna terminals, there shall be a dc path from the antenna terminals to chassis not exceeding $100\text{ k}\Omega$.

The information in any volatile memory device shall be protected from interruptions in the power supply of up to 60 s duration.

4.4 Labelling

The voltage of the power supply that the equipment is intended to operate from, shall be clearly indicated on the equipment.

5 Technical requirements

5.1 Switching time

The channel switching arrangement 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 s.

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

5.2 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, and G2B for DSC signalling as specified in clause 1.3.2 of Recommendation ITU-R M.493-14 [2].

5.3 Use of Channel 70

Only Digital Selective Calling (DSC) is permitted on channel 70.

5.4 Audio line

The equipment shall have audio line input and output with $600\ \Omega$ impedance, symmetrical and free of earth. The audio lines shall operate with voltage levels adjustable within the range 0,775 V rms to 0,078 V rms, this is equivalent to 0 dBm to -20 dBm.

5.5 DSC Controller Interfaces

If the equipment is designed for connection to an external DSC controller via audio frequency terminals, the input and output impedances shall be 600Ω free of earth.

If the equipment is designed for connection to an external DSC controller via binary inputs and outputs, the logic level shall comply with Recommendation ITU-T V.11 [3].

The transmitter key input interface shall be a 2-wire circuit closure to transmit with a maximum open circuit voltage of 50 V and a maximum closed circuit current of 100 mA.

6 General conditions of measurement

6.1 Arrangements for test signals applied to the receiver input

Test signal sources shall be connected to the receiver input in such a way that the impedance presented to the receiver input is 50Ω non-reactive, irrespective of whether one or more test signals are applied to the receiver simultaneously.

The levels of the test signals shall be expressed in terms of the emf at the terminals to be connected to the receiver.

The nominal frequency of the receiver is the carrier frequency of the selected channel.

6.2 Squelch

The squelch or mute circuit shall be switched off for the duration of the conformance tests.

6.3 Normal test modulation

For normal test modulation, the modulation frequency shall be:

- 25 kHz channels: 1 kHz and the frequency deviation shall be ± 3 kHz.
- 12,5 kHz channels: 1 kHz and the frequency deviation shall be $\pm 1,5$ kHz.

6.4 Artificial antenna

When tests are carried out with an artificial antenna, this shall be a non-reactive, non-radiating 50Ω load.

6.5 Standard test signals for DSC

6.5.1 References to standard test signals

Standard test signals consist of a series of identical call sequences, each of which contains a known number of information symbols, format specifier, address, category, identification, etc. as defined in Table A1-4.1 to Table A1-4.9 of Recommendation ITU-R M.493-14 [2] see also clause 6.6. Standard test signals should be of sufficient length for the measurements to be performed or it should be possible to repeat them without interruption to make the measurements.

6.5.2 Standard test signal

The standard test signal for the VHF DSC decoder shall be a phase-modulated signal at VHF channel 70 (or other suitable channel where channel 70 is not available within this equipment) with modulation index = 2. The modulating signal shall have a nominal frequency of 1 700 Hz and a frequency shift of ± 400 Hz with a modulation rate of 1 200 Baud. For non-integrated equipment, the standard test signal shall be the modulating signal only.