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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

Reference
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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).

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

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.

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] 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 Radi ated 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 kΩ.

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 Ω 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 600 Ω 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 50 Ω 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 ±1,5 kHz.

6.4 Artificial antenna

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