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Radiotelephone transmitters and receivers for the maritime mobile service operating in VHF bands; Technical characteristics and methods of measurement

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Foreword

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

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 shipborne radio transmitters and receivers for fixed installations operating in the VHF frequency bands between 156 MHz and 174 MHz used by the maritime mobile service, using both 25 kHz and 12,5 kHz channels and capable of Radiotelephony and Digital Selective Calling communications within the Global Maritime Distress and Safety System. The present document incorporates the requirements of the relevant resolutions of the International Maritime Organization (IMO) and is primarily intended to specify equipment suitable for fitting to ships subject to the SOLAS Convention [i.2] and complying with the Council Directive 2014/90/EU [i.3] of 23 July 2014 on marine equipment (the European Marine Equipment Directive).

The present document does not address the testing of ancillary equipment on a stand-alone basis, i.e. separately from the radio equipment with which it is to be used.

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 https://docbox.etsi.org/Reference/.

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

[1] Void.

[2] Void.

[3] IMO Resolution A.803(19) (as amended by MSC.68(68)): "Performance Standards for Shipborne VHF Radio Installations capable of Voice Communications and Digital Selective Calling".

[4] ITU Radio Regulations (2016).

[5] Recommendation ITU-R M.493-14 (2015): "Digital selective-calling system for use in the maritime mobile service".

[6] Recommendation ITU-R M.541-10 (2015): "Operational procedures for the use of digital selective-calling equipment in the maritime mobile service".

[7] Recommendation ITU-T O.41 (1994): "Psophometer for use on telephone-type circuits".

[8] Void.

[9] ETSI EN 300 338-2 (V1.4.1): "Technical characteristics and methods of measurement for equipment for generation, transmission and reception of Digital Selective Calling (DSC) in the maritime MF, MF/HF and/or VHF mobile service; Part 2: Class A/B DSC".

[10] IEC 61162-1 (2016): "Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners".

[11] Void.

[12] 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".

[13] Void.

[14] 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".

[15] Void.

[16] IEC 61000-4-11 (Ed.2.0) (2004): "Electromagnetic compatibility (EMC) - Part 4-11: Testing and measuring techniques - Voltage dips, short interruptions and voltage variations immunity tests".

[17] ETSI EN 301 033 (V1.4.1) (2013): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Technical characteristics and methods of measurement for shipborne watchkeeping receivers for reception of Digital Selective Calling (DSC) in the maritime MF, MF/HF and VHF bands".

[18] Recommendation ITU-R M.489-2 (1995): "Technical characteristics of VHF radiotelephone equipment operating in the maritime mobile service in channels spaced by 25 kHz".

[19] Recommendation ITU-R SM.329-12 (2012): "Unwanted emissions in the spurious domain".

[20] Void.

[21] Recommendation ITU-T E.161 (2001): "Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network".

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] IMO Resolution A.524(13): "Performance Standards for VHF Multiple Watch Facilities".

[i.2] IMO SOLAS 1974: "International Convention for the Safety of Life at Sea" as amended.

[i.3] Council Directive 2014/90/EU of 23 July 2014 on marine equipment.

[i.4] 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.5] ETSI TS 101 570-2 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Interoperability Testing for Maritime Digital Selective Calling (DSC) Radios; Part 2: Class A/B Test Descriptions".

[i.6] CENELEC EN 60945 (2002): "Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results".

[i.7] 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".

[i.8] ETSI EN 301 843-2: "ElectroMagnetic Compatibility (EMC) standard for marine radio equipment and services; Harmonised Standard for electromagnetic compatibility; Part 2: Specific conditions for VHF radiotelephone transmitters and receivers".

[i.9] Recommendation ITU-R SM.332-4 (1978): "Selectivity of receivers".

[i.10] Recommendation ITU-R M.689-2 (1994): "International maritime VHF radiotelephone system with automatic facilities based on DSC signalling format".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

ancillary equipment: Equipment (apparatus) used in connection with a transmitter or receiver is considered to be an ancillary equipment if:

- the equipment is intended for use in conjunction with a transmitter or receiver to provide additional operational or control features to the radio equipment (e.g. to extend control to another position or location); and
- the equipment cannot be used on a standalone basis to provide user functions independently of the radio equipment; and
- the radio equipment to which it is connected is capable of providing some intended operation, such as transmitting or receiving, without the ancillary equipment (i.e. it is not a sub-unit of the radio equipment essential to the basic functions of the radio equipment).

duplex operation: operating method in which transmission is possible simultaneously in both directions of a telecommunications channel

enclosure port: physical boundary of the apparatus through which electromagnetic fields may radiate or impinge

NOTE: In the case of integral antenna equipment, this port is inseparable from the antenna port.

equipment: marine receiver, transmitter or transmitter/receiver (transceiver) intended for installation and use onboard ships, and powered by the ship's supply

NOTE: Such equipment may be operated with ancillary equipment but, if so, is not dependent upon it for basic functionality.

G2B: phase-modulation (frequency modulation with a pre-emphasis of 6 dB/octave) for Digital Selective Calling (DSC) operation

NOTE: The carrier is modulated by a sub-carrier which is FSK modulated by digital data.

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

integral antenna: antenna designed to be connected directly to the equipment with or without the use of an external connector and considered to be part of the equipment

NOTE: An integral antenna may be fitted internally or externally to the equipment.

modulation index: ratio between the frequency deviation and the frequency of the modulating audio signal

performance check: check of the transmitter frequency error, carrier power, audio frequency harmonic distortion of emission; and receiver sensitivity

port: particular interface of the specified equipment (apparatus), with the electromagnetic environment

EXAMPLE: Any connection point on an equipment intended for connection of cables to or from that equipment is considered as a port (see Figure 1).

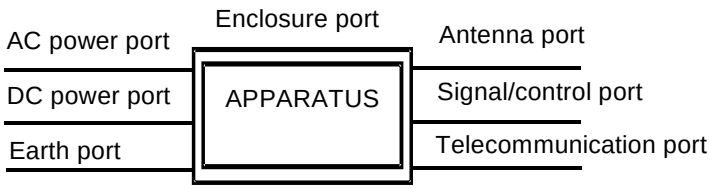

Figure 1: EUT Ports for EMC purposes

Q ratio: ratio of an observed magnitude of acceleration at the equipment to the magnitude of acceleration at the base of the vibration table

semi-duplex operation: operating method in which simplex operation is used at one end of the circuit and duplex operation at the other

simplex: operating method in which transmission is made possible alternately in each direction of a telecommunications channel, for example, by means of manual control

spurious emission: emission on a frequency, or frequencies, which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information

NOTE: Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out of-band emissions (see ITU Radio Regulations [4]).

switching range: maximum frequency range over which the receiver or the transmitter can be operated without reprogramming or realignment

3.2 Symbols

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

dBA	sound pressure relative to 2×10^{-5} Pa
dBd	antenna gain relative to a half-wave dipole
f_{IF}	Intermediate Frequency
f_{lo}	frequency of the local oscillator signal

3.3 Abbreviations

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

AC	Alternating Current
ad	amplitude difference
AIS	Automatic Identification System
ARQ	Automatic Response reQuest
DC	Direct Current
DSC	Digital Selective Calling
EMC	ElectroMagnetic Compatibility
emf	electromotive force
EUT	Equipment Under Test
FEC	Forward Error Correction
fd	frequency difference
FM	Frequency Modulation
FSI	Frequency Set Information
GMDSS	Global Maritime Distress and Safety System
IF	Intermediate Frequency
IMO	International Maritime Organization
MF/HF	Medium Frequency/High Frequency
MPFD	Maximum Permitted Frequency Deviation
MUS	Maximum Usable Sensitivity
NBDP	Narrow Band Direct Printing
pd	potential difference
PSTN	Public Switched Telephone Network
RBW	Reference Bandwidth
RF	Radio Frequency
rms	root mean square
SER	Symbol Error Rate
SINAD	Signal + Noise + Distortion/Noise + Distortion
sr	switching range
VDR	Voyage Data Recorder
VHF	Very High Frequency

4 General requirements

4.1 Construction

The manufacturer shall declare compliance to the requirements of this clause (clause 4) and shall provide relevant documentation.

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 on board ships.

All controls shall be of sufficient size to enable the usual control functions to be easily performed and the number of controls should be the minimum necessary for simple and satisfactory operation.

All parts of the equipment to be checked during inspection or maintenance operations shall be readily accessible. The components shall be readily identifiable.

Technical documentation shall be supplied with the equipment.

The equipment, which may consist of more than one unit, shall be capable of operating on single frequency (simplex) and two-frequency (semi-duplex) channels with manual control. When operating on two-frequency channels there shall be a separation of 4,6 MHz between the transmitting frequency and the receiving frequency (see Radio Regulations Appendix 18 [4]). The equipment may also be capable of operating on two-frequency channels without manual control (duplex).

The equipment shall be able to operate on appropriate channels as defined in Appendix 18 to the Radio Regulations [4], noting in particular footnotes m) and e).

If 12,5 kHz channels are implemented in the equipment it shall be in accordance with Recommendation ITU-R M.1084-5 [14].

Additional VHF channels for maritime use outside those defined by Appendix 18 to the Radio Regulations [4] 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).

The equipment shall be so designed that use of channel 70 for purposes other than DSC is prevented (signalling on channel 70 shall conform with Recommendations ITU-R M.493-14 [5] and M.541-10 [6]), and that use of channels AIS1 and AIS2 for purposes other than AIS is prevented.

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.

4.2 DSC operation

Regarding DSC operation the present document only deals with equipment having integrated or associated DSC encoder/decoder.

If the radio equipment under test is intended for DSC operation in connection with an external DSC encoder/decoder, compliance with the present document can only be achieved, if the manufacturer supplies the test house with the specific stand-alone DSC encoder/decoder, intended for DSC operation, in connection with the radio equipment under test. The radio equipment and the external DSC encoder/decoder shall then be tested as fully integrated DSC equipment in accordance with clauses 11 and 13.

It shall be notified in the test report, that the tests carried out only secure compliance to the present document, if the specific radio equipment along with the specific DSC encoder/decoder is used together as integrated equipment.

Interfaces for external DSC encoder/decoder are not mandatory.

If interfaces for external DSC encoder / decoder are provided then they shall be in compliance with clauses 5.4.2 and 5.4.3.