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**Ultra-High Frequency (UHF) on-board vessels
communications systems and equipment;
Harmonised Standard covering the essential requirements
of article 3.2 of the Directive 2014/53/EU**

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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.7] 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.3].

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 technical characteristics required for UHF on board vessels radio equipment and systems operating on frequencies allocated to the maritime mobile services by the ITU Radio Regulations [i.1].

The present document contains requirements to demonstrate that "... *Radio equipment shall be so constructed that it both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference*" [i.3].

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of article 3 of the Directive 2014/53/EU [i.3] may apply to equipment within the scope of 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-R M.1174-3 (2015): "Technical characteristics of equipment used for on-board vessel communications in the bands between 450 and 470 MHz".
- [2] Recommendation ITU-T O.41-(1994): "Psophometer for use on telephone-type circuits".
- [3] ISO 25862:2009: "Ships and marine technology -- Marine magnetic compasses, binnacles and azimuth reading devices".
- [4] 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".
- [5] Recommendation ITU-T O.153 (1992): "Basic parameters for the measurement of error performance at bit rates below the primary rate".

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.

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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] ITU Radio Regulations (2016).
- [i.2] Recommendation ITU-R SM.332-4: "Selectivity of receivers".

- [i.3] 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.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 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.6] ETSI TS 102 658: "Digital Private Mobile Radio (dPMR) using FDMA with a channel spacing of 6,25 kHz".
- [i.7] 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.

3 Definitions, symbols and abbreviations

3.1 Definitions

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

adjacent and alternate channels:

- adjacent channels are those two channels offset from the wanted channel by the channel spacing;
- alternate channels are those two channels offset from the wanted channel by double the channel spacing.

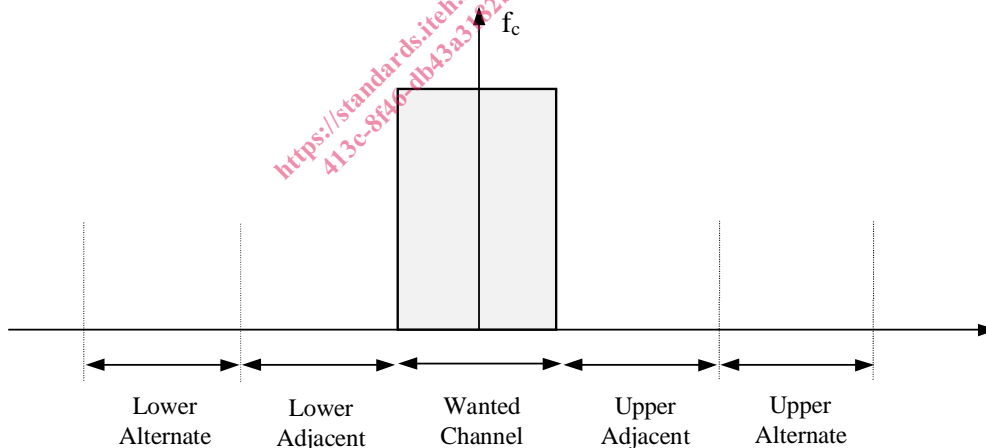


Figure 0: Adjacent and alternate channel definitions

bit: binary digit

block: smallest quantity of information that is sent over the radio channel

NOTE: A constant number of useful bits are always sent together with the corresponding redundancy bits.

integral antenna: antenna designed as a fixed part of the equipment, without the use of an external connector and as such which cannot be disconnected from the equipment by the user

message: user data to be transferred in one or more packets in a session

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:

dBa Relative to 2×10^{-5} Pa

3.3 Abbreviations

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

4FSK	Four level Frequency Shift Keying
ad	amplitude difference
CBW	Channel BandWidth
CSP	Channel Spacing Parameters
CW	Carrier Wave
EFTA	European Free Trade Association
emf	electro-motive force
EU	European Union
fd	frequency difference
IF	Intermediate Frequency
ISO	International Organization for Standardization
ITU-R	International Telecommunication Union - Radiocommunication Sector
ITU-T	International Telecommunication Union - Telecommunication Sector
MPFD	Maximum Permissible Frequency Deviation
PEP	Peak Envelope Power
PR	Radiated Power
PX	Maximum Power
RBW	Reference BandWidth
RF	Radio Frequency
rms	root mean square
SINAD	signal + noise + distortion / noise + distortion
UHF	Ultra 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 and the equipment shall be suitable for use on board vessels.

For portable equipment the colour shall be neither orange nor yellow.

4.2 Frequencies

The equipment shall operate either on single-frequency or two-frequency simplex channels on those frequencies specified in Recommendation ITU-R M.1174-3 [1].

Table 1: Operating channels and frequencies

Channel Spacing	Channel Number	Frequency
25 kHz	1	457,525 MHz
25 kHz	2	457,550 MHz
25 kHz	3	457,575 MHz
25 kHz	4	467,525 MHz
25 kHz	5	467,550 MHz

Channel Spacing	Channel Number	Frequency
25 kHz	6	467,575 MHz
12,5 kHz	11	457,525 MHz
12,5 kHz	12	457,5375 MHz
12,5 kHz	13	457,550 MHz
12,5 kHz	14	457,5625 MHz
12,5 kHz	15	457,575 MHz
12,5 kHz	21	467,525 MHz
12,5 kHz	22	467,5375 MHz
12,5 kHz	23	467,550 MHz
12,5 kHz	24	467,5625 MHz
12,5 kHz	25	467,575 MHz
6,25 kHz	102	457,515625 MHz
6,25 kHz	111	457,521875 MHz
6,25 kHz	112	457,528125 MHz
6,25 kHz	121	457,534375 MHz
6,25 kHz	122	457,540625 MHz
6,25 kHz	131	457,546875 MHz
6,25 kHz	132	457,553125 MHz
6,25 kHz	141	457,559375 MHz
6,25 kHz	142	457,565625 MHz
6,25 kHz	151	457,571875 MHz
6,25 kHz	152	457,578125 MHz
6,25 kHz	161	457,584375 MHz
6,25 kHz	202	467,515625 MHz
6,25 kHz	211	467,521875 MHz
6,25 kHz	212	467,528125 MHz
6,25 kHz	221	467,534375 MHz
6,25 kHz	222	467,540625 MHz
6,25 kHz	231	467,546875 MHz
6,25 kHz	232	467,553125 MHz
6,25 kHz	241	467,559375 MHz
6,25 kHz	242	467,565625 MHz
6,25 kHz	251	467,571875 MHz
6,25 kHz	252	467,578125 MHz
6,25 kHz	261	467,584375 MHz

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

Duplex repeater operation shall use a 10,000 MHz frequency separation with appropriate channel pairs.

4.3 Controls

The equipment shall have the following controls:

- a channel selector which shall indicate the designator of the channel to which the equipment is set;
- on/off switch for the equipment with visual indication that the equipment is switched on;
- a manual non-locking, push-to-talk switch to operate the transmitter (except for repeater equipment);
- an audio-frequency power volume control (except for repeater equipment).

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

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.

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

4.5 Safety precautions

Provision shall be made for protecting equipment from the effects of excessive current or voltage. Means shall be incorporated to prevent reversal of polarity of the battery power supply.

Equipment with an antenna socket shall not be damaged by the effect of open-circuit or short-circuit of the antenna socket for a period of at least 5 minutes.

The manufacturer shall declare the compass safe distance as measured according to ISO 25862 [3].

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) on 25 or 12,5 kHz channels or 4FSK digital modulation on 6,25 kHz channels.

4.7 Batteries for portable equipment

The battery may be an integral part of the equipment.

Primary and/or secondary batteries may be used.

Provisions shall be made for replacing the battery easily.

If the equipment is fitted with secondary batteries, a suitable battery charger shall be recommended by the manufacturer.

4.8 Loudspeaker and microphone

The equipment shall be provided with a microphone and a loudspeaker which may be combined (except for repeater equipment).

In the transmit condition the output of the receiver shall be muted (except for repeater equipment).

4.9 Labelling

All controls shall be clearly labelled. The labelling shall include the compass safe distance.

5 Test conditions, power sources and ambient temperatures

5.1 Normal and extreme test conditions

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

5.2 Test power source

Unless otherwise stated, the battery of the equipment shall be replaced by a test power source capable of producing normal and extreme test voltages as specified in clauses 5.3.2 and 5.4.2.

The voltage of the power source shall be measured at the input terminal of the equipment.

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

5.3 Normal test conditions

5.3.1 Normal temperature and humidity

The normal temperature and humidity conditions for tests shall be a combination of temperature and humidity within the following limits:

- temperature: +15 °C to +35 °C;
- relative humidity: 20 % to 75 %.

5.3.2 Normal test voltage

5.3.2.1 Battery power source

Where the equipment is designed to operate from a battery, the normal test voltage shall be the nominal voltage of the battery.

5.3.2.2 Other power sources

For operation from other power sources, the normal test voltage shall be that declared by the manufacturer.

5.4 Extreme test conditions

5.4.1 Extreme temperatures

5.4.1.1 Upper extreme temperature

Tests at the upper extreme temperature shall be made at +55 °C.

5.4.1.2 Lower extreme temperature

Tests at the lower extreme temperature shall be made at -20 °C.

5.4.2 Extreme test power supply values

5.4.2.1 Upper extreme test voltage - Portable equipment

The upper extreme test voltage shall be declared by the manufacturer and shall not be lower than the following:

- when using primary batteries, the voltage corresponding to the voltage that a fresh battery gives at the upper extreme temperature when loaded with a load equal to that of the equipment in the muted receive condition;
- when using secondary batteries, the voltage corresponding to the voltage that a fully charged battery gives at the upper extreme temperature when loaded with a load equal to that of the equipment in the muted receive condition.