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Maritime Broadband Radiolink operating within the bands 5 852 MHz to 5 872 MHz and/or 5 880 MHz to 5 900 MHz for ships and off-shore installations engaged in coordinated activities; Harmonised Standard for access to radio spectrum

Reference
REN/ERM-TGMAR-604

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Foreword

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

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.2] 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.1].

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.

National transposition dates	
Date of adoption of this EN:	6 January 2021
Date of latest announcement of this EN (doa):	30 April 2021
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 October 2021
Date of withdrawal of any conflicting National Standard (dow):	31 October 2022

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 technical characteristics and methods of measurements for below-deck equipment for maritime mobile broadband radiocommunication systems (MBR) radio equipment utilizing integral electronically phase steered antennae applicable for communications between vessels and between vessels and platforms engaged in coordinated off-shore activities and intended to operate at the frequencies shown in table 1, operating with linear polarization or Left Hand Circular Polarization (LHCP)

Table 1: MBR operating frequencies

Operation	MBR operating frequencies
Transmission	5 862 MHz, 5 890 MHz
Reception	5 862 MHz, 5 890 MHz

NOTE: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU is given in annex A.

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.

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.150 (05-1996) plus corrigendum 1 (05/2002): "General requirements for instrumentation for performance measurements on digital transmission equipment".

[2] 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".

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] 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.2] 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.3] ECC Recommendation (17)03 (2017): "Guidance for the harmonised use and coordination of Maritime Broadband Radio (MBR) systems on board ships and off-shore platforms operating within the frequency bands 5852-5872 MHz and 5880-5900 MHz".

[i.4] ETSI EG 203 336 (V1.2.1) (05-2020): "Guide for the selection of technical parameters for the production of Harmonised Standards covering article 3.1(b) and article 3.2 of Directive 2014/53/EU".

[i.5] ERC Recommendation 74-01 (2019): "Unwanted emissions in the spurious domain".

[i.6] ITU Radio Regulations (2020).

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

out-of-band domain: frequency range, immediately outside the necessary bandwidth but excluding the spurious domain

switching range: maximum frequency band within which an equipment can operate

3.2 Symbols

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

C_F	Minimum number of frames
dB_c	Level (dB) below carrier
dBm	Level (dB) relative to 1 mW
dBW	Level (dB) relative to 1 W
f	frequency
N	Number of transmitted bits
ppm	parts per million (10^{-6})
s	second
V	Volt

3.3 Abbreviations

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

ac	alternating current
ATPC	Adaptive Transmitter Power Control
BER	Bit Error Rate
CRC	Cyclic Redundancy Check
EIRP	Equivalent Isotropically Radiated Power
EUT	Equipment Under Test
FER	Frame Error Rate
LHCP	Left Hand Circular Polarization
MBR	Maritime Broadband Radiolink
NA	Not Applicable
OOB	Out Of Band
PTT	Push To Talk

RBW	Reference BandWidth
RF	Radio Frequency
sr	switching range
TDMA	Time Division Multiple Access
VSWR	Voltage Standing Wave Ratio

4 Technical requirements specifications

4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be in accordance with its intended use, but as a minimum, shall be that specified in the test conditions contained in the present document. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the operational environmental profile defined by its intended use.

4.2 General and operational requirements

4.2.0 General

Compliance with clauses 4.2.1, clause 4.2.2 and clause 4.2.3 shall be established by simple inspection of the equipment and its technical documentation.

4.2.1 Construction

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. The equipment shall be capable of operating on single frequency channels.

4.2.2 Controls and indicators

The equipment shall have a channel selector and shall indicate the channel at which the installation is set. The operating channel shall be legible irrespective of the external lighting conditions.

The equipment shall have the following additional controls and indicators:

- an on/off switch for the entire installation with a visual indication that the installation is in operation;
- a visual indication that the equipment is transmitting.

The equipment shall also meet the following requirements:

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

4.2.3 Labeling

All controls, instruments, indicators and ports shall be clearly labelled. Details of the power supply from which the equipment is intended to operate shall be clearly indicated on the equipment.

4.3 Transmitter Requirements

4.3.1 Operating Frequency error

4.3.1.1 Definition

The frequency error is the difference between the measured carrier frequency and its nominal value.

4.3.1.2 Method of measurement

The measurement setup shall be as in Figure 1.

The MBR transmitter shall be configured to transmit on the highest frequency available in the equipment, at a normal RF output power level using test signal 1.

The receiving test antenna shall be connected to a frequency counter.

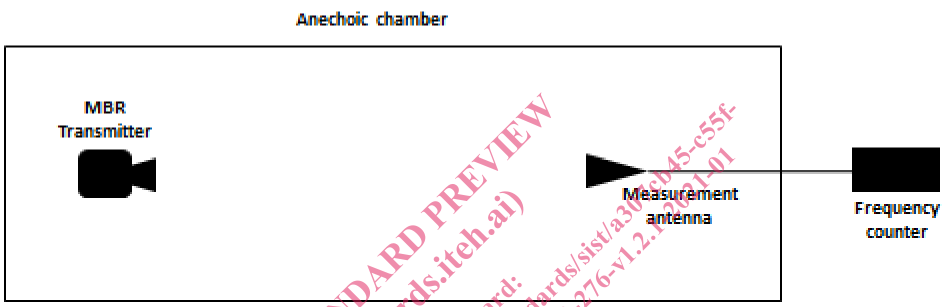

Figure 1: Measurement set up for operating frequency error

The transmitter frequency shall be measured and noted.

4.3.1.3 Limits

The measured frequency error shall not exceed 2 ppm.

4.3.2 Transmitter EIRP

4.3.2.1 Definition

The transmitter EIRP is the maximum radiated power of the equipment with its associated antenna.

4.3.2.2 Method of measurement

The measurement setup shall be as in Figure 2.

The MBR transmitter shall be configured to operate at maximum RF output power level using test signal 1.

The receiving test antenna shall be connected to a spectrum analyser.

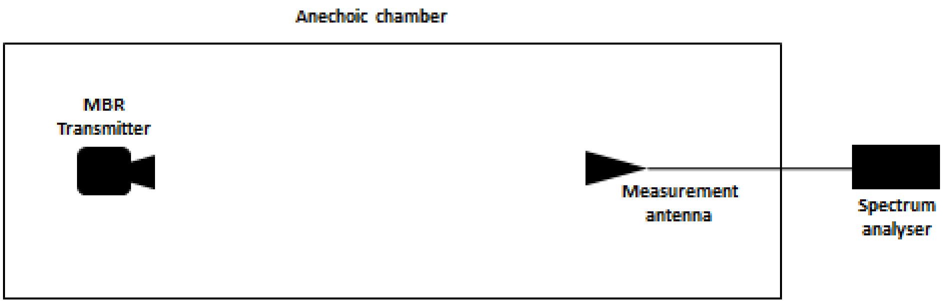

Figure 2: Measurement setup for transmitter EIRP

Max Hold (peak detector) shall be selected and the centre frequency adjusted to that of the EUT.

The peak value of the power envelope shall be measured and noted.

For measuring the transmitter EIRP, the substitution method described in clause 4 of ETSI TS 103 052 [2] shall be used.

4.3.2.3 Limits

The EIRP shall not exceed 25 dBW (55 dBm) with left hand circular polarized radiation and 22 dBW (52 dBm) with linear polarized radiation.

NOTE: These values are specified in Annex 1 of ECC Recommendation (17)03 [i.3].

4.3.3 Adaptive Transmitter Power Control

4.3.3.1 Definition

Adaptive power control is an automatic mechanism to regulate the transmitter output power.

4.3.3.2 Method of measurement

The measurement setup shall be as in Figure 3.

For the measurement, two MBR equipments (MBR A and MBR B) shall be used to establish a normal MBR communication link using test signal 2.

The equipment under test (MBR A) shall be operated at a power level that produces a signal level of at least 50 dB above the sensitivity level (see clause 4.4.1) at MBR B with the Adaptive Transmitter Power Control (ATPC) inactive.

The receiving test antenna shall be connected to a spectrum analyser.

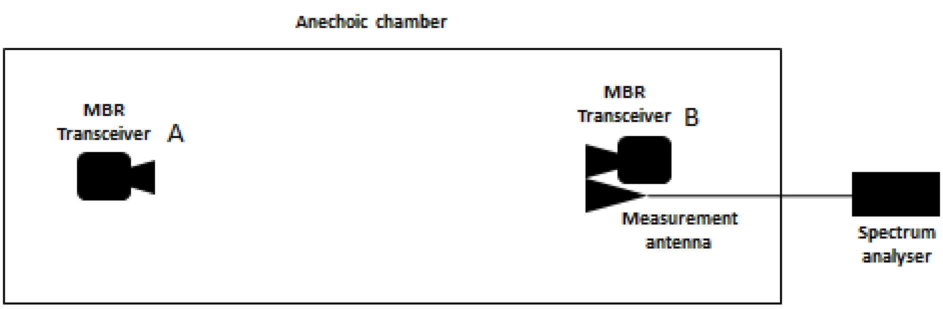

Figure 3: Measurement setup for adaptive transmitter power control

Max Hold (peak detector) shall be selected and the output power of the equipment under test (MBR A) shall be measured.

The ATPC in the equipment (MBR A) under test shall then be activated and the change of the output power shall be measured.

4.3.3.3 Limits

The output power of the EUT shall be reduced by the ATPC by at least 25 dB.

NOTE: The value is specified in Annex 1 of ECC Recommendation (17)03 [i.3].

4.3.4 Transmitter spectrum mask

4.3.4.1 Definition

A spectrum mask is a set of limit lines applied to a plot of a transmitter spectrum. The transmitter spectrum mask defines emission limits in the out-of-band domain.

4.3.4.2 Method of measurement

The measurement setup shall be as in Figure 4.

The MBR transmitter shall be configured to operate at a maximum EIRP using test signal 2.

The receiving test antenna shall be connected to a spectrum analyser.

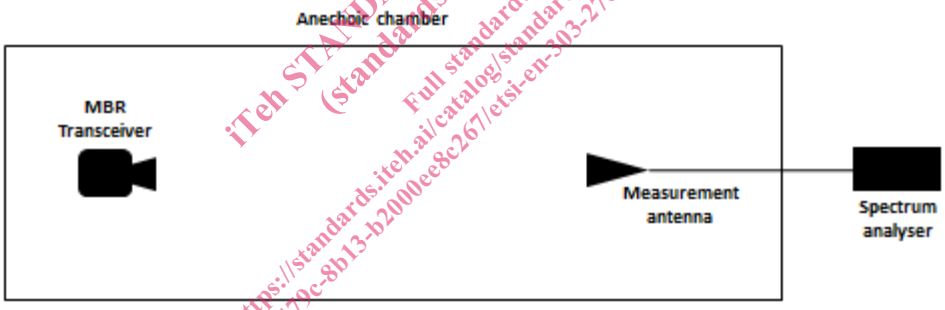

Figure 4: Measurement setup for transmitter spectrum mask

Max Hold (peak detector) shall be selected and the centre frequency adjusted to that of the EUT.

The measurement shall be performed with a measuring bandwidth of 1 MHz

The value of the power shall be measured and noted over the frequency range between -50 MHz and +50 MHz relative to the centre frequency.

4.3.4.3 Limits

The emissions shall not exceed the transmitter spectrum mask in figure 5 or an absolute level of -30 dBm/MHz, whichever is greater.

NOTE: The spectrum mask is specified in ECC Recommendation (17)03 [i.3].