Draft ETSI EN 301 843-2 V2.2.2 (2025-12)

HARMONISED EUROPEAN STANDARD

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 operating in the frequency range 156 MHz to 174 MHz

Reference
REN/ERM-EMC-414

Keywords
EMC, harmonised standard, maritime, radio, regulation, VHF

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Sous-Préfecture de Grasse (06) N° w061004871

Contents

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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 Standardisation Request deliverable Approval Procedure (SRdAP).

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.

The present document is part 2 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

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 covers the assessment of VHF radiotelephone transmitters and receivers for the maritime mobile service operating in the frequency range 156 MHz to 174 MHz, and ancillary equipment in respect of ElectroMagnetic Compatibility (EMC) intended to be used in a marine environment.

Technical specifications related to the antenna port and emissions from the enclosure port of marine radiotelephone transmitters and receivers are not included in the present document. Such technical specifications are found in the related product standards for the effective use of the radio spectrum.

The present document specifies the applicable test conditions, performance assessment, and performance criteria for VHF radiotelephone transmitters and receivers for the maritime mobile service, and associated ancillary equipment.

NOTE: The relationship between the present document and essential requirements of article 3.1b of Directive 2014/53/EU [i.2] 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 in the ETSI docbox.

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] ETSI EN 301 843-1 (V2.3.0): "ElectroMagnetic Compatibility (EMC) standard for marine radio equipment and services; Part 1: Common technical requirements".

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 may be useful in implementing an ETSI deliverable or add to the reader's understanding, but are not required for conformance to the present document.

[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] Void.

[i.4] Void.

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI EN 301 843-1 [1] apply.

3.2 Symbols

For the purposes of the present document, the symbols given in ETSI EN 301 843-1 [1] apply.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 301 843-1 [1] and the following apply:

GNSS	Global Navigation Satellite System
NMEA	National Marine Electronics Association

4 General and operational requirements

4.1 Environmental profile

The provisions of ETSI EN 301 843-1 [1], clause 4.1 shall apply.

4.2 Arrangements for test signals

4.2.0 General

The provisions of ETSI EN 301 843-1 [1], clause 4.2.0 shall apply.

4.2.1 Arrangements for test signals at the input of the transmitter

The provisions of ETSI EN 301 843-1 [1], clause 4.2.1 shall apply where the test modulation is specified in clause 4.5 of the present document.

The signal source shall be applied at the microphone input of the transmitter either directly if a microphone input connection as available, or indirectly using an acoustic coupler if not.

4.2.2 Arrangements for test signals at the output of the transmitter

The provisions of ETSI EN 301 843-1 [1], clause 4.2.2 shall apply.

4.2.3 Arrangements for test signals at the input of the receiver

4.2.3.1 GNSS test signals

For EUT with an integral GNSS receiver, a GNSS source outside the test environment shall be provided and this shall be re-radiated into the test environment. The source of the GNSS signal may be either a live sky signal, recorded signal or simulated signal.

For radiated immunity, the level of the wanted GNSS signal at the enclosure port of the EUT, shall be 20 dB above the minimum sensitivity for the EUT.

The method to establish the required level shall be as follows:

a) Ensure all immunity test sources are switched off.

b) Substitute the EUT with a GNSS receiver continuously outputting position fix data and monitor this data.

c) Switch on the GNSS source and increase the level as necessary to establish a GNSS fix on the substitution GNSS receiver.

d) Reduce the level of the wanted GNSS signal progressively in 1 dB steps until the data indicates that the position fix has been lost.

e) Increase the level of the wanted GNSS signal by 21 dB.

f) Remove the substitution GNSS receiver and replace the EUT in the same position.

4.2.3.2 Marine communication test signals

The provisions of ETSI EN 301 843-1 [1], clause 4.2.3 shall apply with the following modifications.

The wanted RF input signal, coupled to the receiver, shall be modulated with normal test modulation as specified in clause 4.5.

The level of the wanted signal shall be 40 dBµV (emf) applied to the antenna connector of the EUT.

4.2.4 Arrangements for test signals at the output of the receiver

The provisions of ETSI EN 301 843-1 [1], clause 4.2.4 shall apply.

4.2.5 Arrangements for testing transmitter and receiver together (as a system)

The provisions of ETSI EN 301 843-1 [1], clause 4.2.5 shall apply with the following modifications.

For combined testing of transceivers or transmitters and receivers operating at the same frequency, two samples of the EUT are required. The wanted RF output signal of the transmitter (sample A) may be used via an attenuator and applied to the input of the receiver (sample B) as the wanted RF input signal.

4.3 Exclusion bands

4.3.0 General

The provisions of ETSI EN 301 843-1 [1], clause 4.3 shall apply.

The emission measurement and immunity test exclusions are referred to as "exclusion bands" and are defined in clauses 4.3.1 and 4.3.2.

4.3.1 Exclusion bands for receivers and receiver parts of transceivers

4.3.1.1 GNSS exclusion bands

For EUT with an integral GNSS receiver, the exclusion band for immunity testing of equipment with GNSS operating in the 1 559 MHz to 1 610 MHz band shall be:

- lower limit of exclusion band = 1 492 MHz (-67 MHz of the lowest band edge frequency)
- upper limit of exclusion band = 1 706 MHz (+96 MHz of the highest band edge frequency)

The exclusion band for immunity testing of equipment with GNSS operating in the 1 164 MHz to 1 300 MHz band shall be:

- lower limit of exclusion band = 1 100 MHz (-64 MHz of the lowest band edge frequency)
- upper limit of exclusion band = 1 364 MHz (+64 MHz of the highest band edge frequency)

4.3.1.2 Marine communication exclusion bands

The exclusion band for marine radiotelephone receivers and receivers of transceivers is the frequency range determined by the switching range for its intended use a extended as follows:

- the lower frequency of the exclusion band is the lower frequency of the switching range, minus 5 % of the centre frequency of the switching range, or minus 10 MHz, whichever will result in the lowest frequency;
- the upper frequency of the exclusion band is the upper frequency of the switching range, plus 5 % of the centre frequency of the switching range, or plus 10 MHz, whichever will result in the highest frequency.

The switching range is the maximum frequency range over which the receiver can be operated without reprogramming or realignment.

4.3.2 Exclusion band for transmitters

The EUT shall be operated on the Distress Urgency and Safety frequency CH16 (156,8 MHz).

The exclusion band for the EUT shall be 156,750 MHz to 156,850 MHz.

4.4 Intermediate frequency responses on receivers

The provisions of ETSI EN 301 843-1 [1], clause 4.4 shall apply with the following modifications.

No immunity tests shall be carried out on frequencies of identified narrow band responses on marine radiotelephone receivers or the receiver part of transceivers.

The nominal frequency offset to be used for the identification of narrowband responses shall be from 50 kHz below to 50 kHz above for the first part of the identification procedure, and from 62,5 kHz below to 62,5 kHz above for its second part.

All narrowband responses shall be disregarded from immunity tests.

4.5 Test modulation

The test modulation shall be as follows:

- the transmitter shall be modulated with a sinusoidal audio frequency of 1 000 Hz and the frequency deviation shall be 3 kHz;
- the wanted RF input signal shall be set to the nominal frequency of the receiver modulated with a sinusoidal audio frequency of 1 000 Hz and a frequency deviation of 3 kHz.

5 Performance assessment

5.1 General

Void.

5.2 Equipment which can provide a continuous communication link

The provisions of ETSI EN 301 843-1 [1], clause 5.2 shall apply.

5.3 Equipment which does not provide a continuous communication link

The provisions of ETSI EN 301 843-1 [1], clause 5.3 shall apply.

5.4 Ancillary equipment

The provisions of ETSI EN 301 843-1 [1], clause 5.4 shall apply.

Any additional ancillary equipment supplied with the EUT shall be connected as per the operating instructions. The EUT and ancillary equipment shall always be tested as a system.

5.5 Equipment classification

The provisions of ETSI EN 301 843-1 [1], clause 5.5 shall apply.

Radiotelephone transmitters and receivers may belong to either the category of mobile or portable marine radio equipment.

6 Performance criteria

6.0 General

The provisions of ETSI EN 301 843-1 [1], clause 6.0 shall apply.

6.1 Performance criteria A for continuous phenomena applied to transmitters and receivers

The provisions of ETSI EN 301 843-1 [1], clause 6.1 shall apply.

During radiated and conducted immunity testing (clauses 9.2 and 9.5 of ETSI EN 301 843-1 [1]), the SINAD value of the speech output signal shall be monitored. The measured SINAD shall be at least 20 dB.

6.2 Performance criteria B for transient phenomena applied to transmitters and receivers

The provisions of ETSI EN 301 843-1 [1], clause 6.2 shall apply.

6.3 Performance criteria C applied to power supply failure

The provisions of ETSI EN 301 843-1 [1], clause 6.3 shall apply.

6.4 Performance check

6.4.1 Transmitter

For the purpose of the present document, a "performance check" of the transmitter is taken to mean a measurement of:

- RF output power;
- frequency error;
- SINAD of the demodulated output signal.

The transmitter shall be connected to an artificial antenna.

The RF output signal shall be connected via an appropriate coupling device to a linear demodulator with a de-emphasis network of 6 dB/octave.

With the output power switch set at maximum:

- the RF output carrier power shall be between 4 W and 6 W for portable devices and between 20 W and 25 W for mobile devices;
- the frequency error of the unmodulated carrier shall not exceed 1,5 kHz;
- with normal test modulation (see clause 4.5), the SINAD of the demodulated output signal shall be 20 dB or better.

6.4.2 Receiver

6.4.2.1 GNSS

A "performance check" of the GNSS receiver is taken to mean the acquisition and the maintenance of a position fix.

The position decoded from the GNSS receiver after the position fix has been obtained shall be checked to ensure that it is correct.

6.4.2.2 VHF Marine Receiver

For the purpose of the present document a "performance check" of the receiver is taken to mean a measurement of the receiver's SINAD with a test signal on CH16 (156,8 MHz) modulated by the test modulation (see clause 4.5) applied to the receiver antenna input.

An audio frequency load and measuring instrument for measuring the SINAD shall be connected to the receiver output terminal using a fixed RF input level of 40 dBµV (emf).

The level of measured SINAD shall be at least 20 dB with the receiver's audio frequency power control adjusted to produce 50 % of the rated output power.

7 Applicability overview

7.0 General

The provisions of ETSI EN 301 843-1 [1], clause 7.0 shall apply.

7.1 EMC Emission

7.1.1 General conditions

For EUT classified as mobile equipment the emission requirements set out in table 1 shall apply. For EUT classified as portable equipment the emission requirements set out in table 2 shall apply. See clause 5.5 of ETSI EN 301 843-1 [1] for a description of these classifications.

Table 1: Emission Requirements for mobile equipment

Phenomenon	Port	Applicability	Reference clause
Radiated emission	Enclosure port of the EUT with its ancillary equipment as a system	Only applicable to a system including ancillary equipment	ETSI EN 301 843-1 [1], clause 8.2
Conducted emission	DC power input/output port	Applicable	ETSI EN 301 843-1 [1], clause 8.3
Conducted emission	AC mains power input/output ports	Applicable	ETSI EN 301 843-1 [1], clause 8.4

Table 2: Emission Requirements for portable equipment

Phenomenon	Port	Applicability	Reference clause
Radiated emission	Enclosure port of the EUT with its ancillary equipment as a system	Only applicable to a system including ancillary equipment	ETSI EN 301 843-1 [1], clause 8.2
Conducted emission	DC power input/output port	Applicable	ETSI EN 301 843-1 [1], clause 8.3
Conducted emission	AC mains power input/output ports	Applicable	ETSI EN 301 843-1 [1], clause 8.4

7.1.2 Special conditions

The following special conditions set out in table 3 shall apply.

Table 3: Special conditions for EMC emission measurements

Reference to clauses in ETSI EN 301 843-1 [1]	Special product-related conditions, additional to or modifying the test conditions in ETSI EN 301 843-1 [1], clause 8
8.2.3: Limits, enclosure port	The relevant exclusion band specified in clause 4.3 shall apply.

7.2 Immunity

7.2.0 Objective

The object of immunity testing in the present document is to ensure that the EUT does not operate spuriously when subjected to electro-magnetic interference.

7.2.1 General conditions

For EUT classified as mobile equipment the immunity tests set out in table 4 shall apply.

For EUT classified as portable equipment the immunity tests set out in table 5 shall apply.

See clause 5.5 of ETSI EN 301 843-1 [1] for a description of these classifications.

Table 4: Immunity tests for mobile equipment

Phenomenon	Port	Applicability	Reference clause	Performance Criteria
RF electromagnetic field (80 MHz to 6 000 MHz)	Enclosure	Applicable	ETSI EN 301 843-1 [1], clause 9.2	A
Electrostatic discharge	Enclosure	Applicable	ETSI EN 301 843-1 [1], clause 9.3	B
Fast transients common mode	AC power	Applicable	ETSI EN 301 843-1 [1], clause 9.4	B
Fast transients common mode	DC power and signal ports	Applicable to ports capable of supporting cables of at least 2 m in length	ETSI EN 301 843-1 [1], clause 9.4	B
RF common mode 0,15 MHz to 80 MHz	AC and DC power and signal ports	Applicable	ETSI EN 301 843-1 [1], clause 9.5	A
Power supply short term variations	AC power port	Applicable	ETSI EN 301 843-1 [1], clause 9.6.1	B
Power supply failure	AC power port	Applicable	ETSI EN 301 843-1 [1], clause 9.6.2	C
Surges	AC power port	Applicable	ETSI EN 301 843-1 [1], clause 9.7	B

Table 5: Immunity tests for portable equipment

Phenomenon	Port	Applicability	Reference clause	Performance Criteria
RF electromagnetic field (80 MHz to 6 000 MHz)	Enclosure	Applicable	ETSI EN 301 843-1 [1], clause 9.2	A
Electrostatic discharge	Enclosure	Applicable	ETSI EN 301 843-1 [1], clause 9.3	B
Fast transients common mode	DC power and signal ports	Applicable to ports capable of supporting cables of at least 2 m in length	ETSI EN 301 843-1 [1], clause 9.4	B
RF common mode 0,15 MHz to 80 MHz	DC power and signal ports	Applicable	ETSI EN 301 843-1 [1], clause 9.5	A

7.2.2 Special conditions

The following special conditions set out in table 6 shall apply.

Table 6: Special conditions for EMC immunity tests

Reference to clauses in ETSI EN 301 843-1 [1]	Special product-related conditions, additional to or modifying the test conditions in ETSI EN 301 843-1 [1], clause 9
9.2.2: Test method; Radio frequency electromagnetic field	The wanted RF input signal for the receiver under test as specified in clause 4.2.3 of the present document. The relevant exclusion band specified in clause 4.3.1 of the present document shall apply.
9.5.2: Test method; Radio frequency, Common mode	The wanted RF input signal for the receiver under test as specified in clause 4.2.3 of the present document. The relevant exclusion band specified in clause 4.3.1 of the present document shall apply.

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

The present document has been prepared under the Commission's standardization 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.

Table A.1: Relationship between the present document and the essential requirements of Directive 2014/53/EU

Harmonised Standard ETSI EN 301 843-2					
Requirement				Requirement Conditionality	
No	Description	Essential requirements of Directive	Clause(s) of the present document	U/C	Condition
1	Emission: Enclosure port of the EUT with its ancillary equipment as a system	3.1(b)	7.1	U	
2	Emission: DC power input/output ports	3.1(b)	7.1	C	Only applies to DC powered equipment
3	Emission: AC mains power input/output ports	3.1(b)	7.1	C	Only applies to AC powered equipment
4	Immunity: Radio frequency electromagnetic field (80 MHz to 6 GHz)	3.1(b)	7.2	U	
5	Immunity: Electrostatic discharge	3.1(b)	7.2	U	
6	Immunity: Fast transients, common mode	3.1(b)	7.2	C	Applies to all ports capable of supporting cables of at least 2m in length
7	Immunity: RF, common mode	3.1(b)	7.2	U	
8	Immunity: Power supply short term variations	3.1(b)	7.2	C	Only applies to AC powered equipment
9	Immunity: Power supply failure	3.1(b)	7.2	C	Only applies to AC powered equipment
10	Immunity: Surges	3.1(b)	7.2	C	Only applies to AC powered equipment

Key to columns:

Requirement:

No A unique identifier for one row of the table which may be used to identify a requirement.

Description A textual reference to the requirement.

Essential requirements of Directive

Identification of article(s) defining the requirement in the Directive.

Clause(s) of the present document

Identification of clause(s) defining the requirement in the present document unless another document is referenced explicitly.

Requirement Conditionality:

U/C Indicates whether the requirement is unconditionally applicable (U) or is conditional upon the manufacturer's claimed functionality of the equipment (C).

Condition Explains the conditions when the requirement is or is not applicable for a requirement which is classified "conditional".

Presumption of conformity stays valid only as long as a reference to the present document is maintained in the list published in the Official Journal of the European Union. Users of the present document should consult frequently the latest list published in the Official Journal of the European Union.

Other Union legislation may be applicable to the product(s) falling within the scope of the present document.

Annex B (informative): Bibliography

- Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.

Annex C (informative): Change history

Version	Information about changes
V2.3.1	• Added new clause 4.3.1.1 for GNSS exclusion bands. • Defined the test frequency as Distress/Urgency/Safety CH16 (156,8 MHz) only throughout the document • Categorization of ancillary equipment in clause 5.4 • Tightened the definition of RF power levels in clause 6.4.1 • Replaced the text with definitive tables in clause 7

History

Version	Date	Status
V1.1.1	February 2001	Publication
V1.2.1	June 2004	Publication
V2.1.1	March 2016	Publication
V2.2.1	November 2017	Publication
V2.2.2	December 2025	SRdAP process EV 20260318: 2025-12-18 to 2026-03-18