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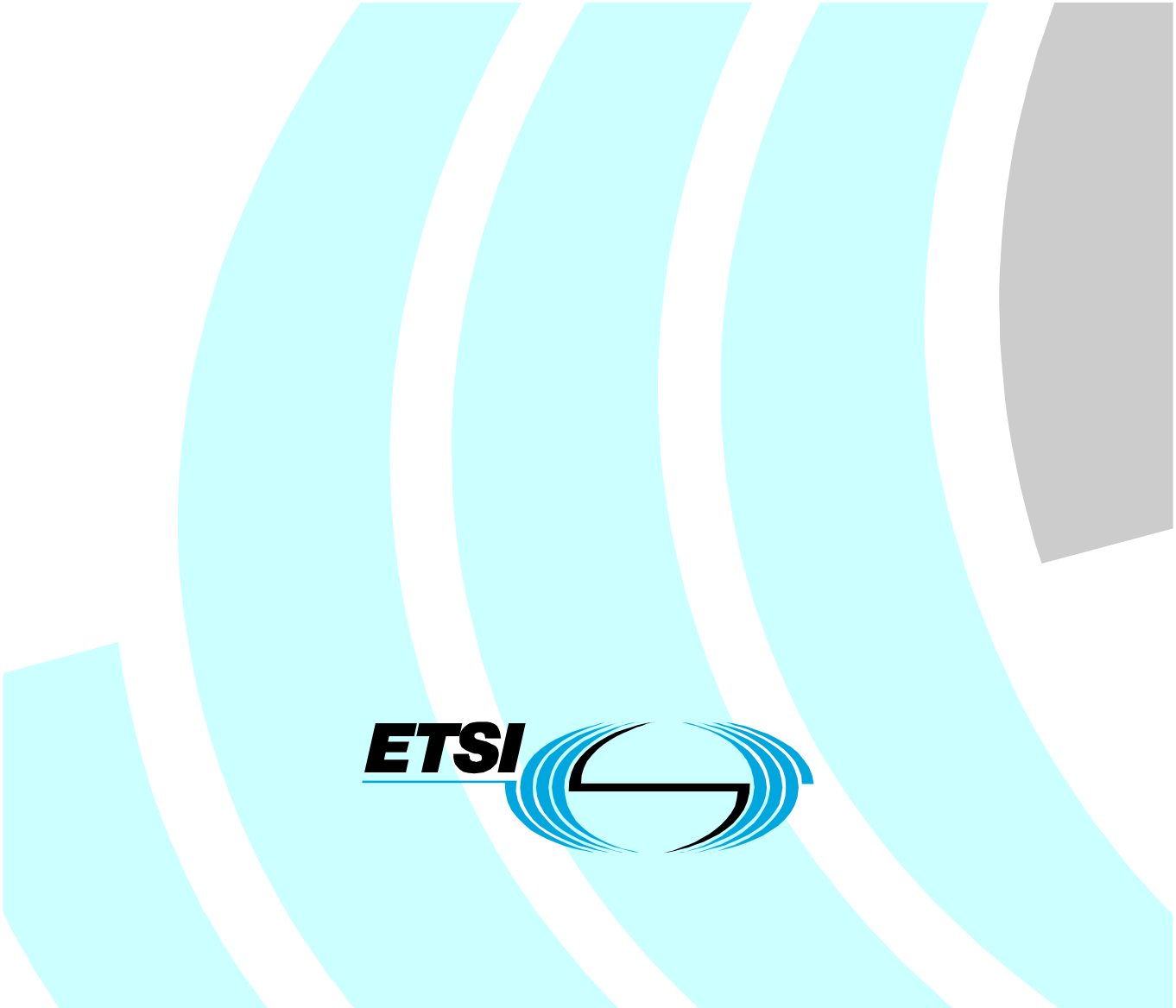
Candidate Harmonized European Standard (Telecommunications series)

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for marine radio equipment and services; Part 5: Specific conditions for MF/HF radiotelephone transmitters and receivers



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Contents

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Foreword

This Candidate Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under the Council Directive 98/34/EC [6] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulation.

The present document, together with EN 301 843-1 [1], is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility ("the EMC Directive") (89/336/EEC [3] as amended), and Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (the "R&TTE Directive" [2]).

The present document is part 5 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

National transposition dates	
Date of adoption of this EN:	4 June 2004
Date of latest announcement of this EN (doa):	30 September 2004
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 March 2005
Date of withdrawal of any conflicting National Standard (dow):	31 March 2006

1 Scope

The present document together with EN 301 843-1 [1], covers the assessment of MF/HF radiotelephone transmitters and receivers for the maritime mobile service, and ancillary equipment in respect of ElectroMagnetic Compatibility (EMC).

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 radiotelephone transmitters and receivers for the maritime mobile service and the associated ancillary equipment.

Examples of types of MF/HF radiotelephone transmitters and receivers for the maritime mobile service covered by the present document are given in annex A.

In case of differences (for instance concerning special conditions, definitions, abbreviations) between the present document and EN 301 843-1 [1], the provisions of the present document take precedence.

The electromagnetic environment used in the present document to develop the technical specifications encompasses the electromagnetic environment onboard ships as identified in EN 60945 [5].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest 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.

[1] ETSI EN 301 843-1 (V1.2.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for marine radio equipment and services; Part 1: Common technical requirements".

[2] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications equipment and the mutual recognition of their conformity (R&TTE Directive).

[3] Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive).

[4] ETSI EN 300 373-2 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Maritime mobile transmitters and receivers for use in the MF and HF bands; Part 2: Harmonized EN covering essential requirements under article 3.2 of the R&TTE directive".

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

[6] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.

[7] ETSI EN 300 373-3 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Maritime mobile transmitters and receivers for use in the MF and HF bands; Part 3: Harmonized EN covering essential requirements under article 3.3(e) of the R&TTE Directive".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

standard output power (audio): (of the receiver) is defined as:

a) 1 mW for earphone reception;

b) 500 mW for loudspeaker reception;

c) 0 dBm (1mW) into 600 Ω for the audio line outputs.

3.2 Symbols

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

emf	electromotive force
rms	root mean square
SINAD	(Signal + Noise + Distortion) / (Noise + Distortion)

3.3 Abbreviations

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

DSC	Digital Selective Calling
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
F1B	Frequency modulation, single channel containing quantized or digital information with the use of a modulating sub-carrier, telegraphy for automatic reception.
HF	High Frequency
J3E	Single Sideband, suppressed carrier, single channel containing analogue information, telephony.
MF	Medium Frequency
RF	Radio Frequency

4 Test conditions

For the purposes of the present document, the test conditions of EN 301 843-1 [1], clause 4, shall apply as appropriate. Further product related test conditions for marine radiotelephone transmitters and receivers are specified in the present document.

4.1 General

The provisions of EN 301 843-1 [1], clause 4.1 shall apply with the following modifications.

For emission and immunity tests the normal test modulation, test arrangements, etc., as specified in the present document, clauses 4.1 to 4.5, shall apply.

The test shall be carried out at a point within the specified normal operating environmental range of temperature and humidity with the equipment connected to the normal power supply voltage.

4.2 Arrangements for test signals

The provisions of EN 301 843-1 [1], clause 4.2 shall apply.

4.2.1 Arrangements for test signals at the input of the transmitter

The provisions of EN 301 843-1 [1], clause 4.2.1 shall apply.

4.2.2 Arrangements for test signals at the output of the transmitter

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

4.2.3 Arrangements for test signals at the input of the receiver

The provisions of 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 for that type of equipment (see clause 4.5).

The level of the wanted signal shall be as follows:

MF (1 605 kHz to 4 000 kHz) J3E Mode: +56 dBuV F1B Mode: +45 dBuV

HF (4 MHz to 27,5 MHz) J3E Mode: +51 dBuV F1B Mode: +40 dBuV

NOTE: Measurements shall only be made in F1B mode where the EUT does not have J3E mode.

4.2.4 Arrangements for test signals at the output of the receiver

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

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

The provisions of EN 301 843-1 [1], clause 4.2.5 shall apply as appropriate.

4.3 Exclusion bands

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

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

4.3.1 Exclusion bands for receivers and receiver parts of transceivers

The exclusion band for marine radiotelephone receivers and receivers of transceivers is the frequency range determined by the switching range, as declared by the manufacturer, 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 exclusion band for marine radiotelephone transmitters extends ±50 kHz from the nominal operating frequency of the transmitter.

4.4 Narrow band responses on receivers

The provisions of 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.

A reduction of the SINAD below 20 dB in the measured value of the speech output signal level shall be used as the criterion for the identification of any unwanted responses.

The nominal frequency offset to be used for the identification of narrowband responses shall be ±8 kHz for the first part of the identification procedure and ±10 kHz for its second part.

All narrowband responses shall be disregarded from immunity tests.

4.5 Normal test modulation

Receive: The normal test modulation shall be as follows:

Class of emission J3E

Unmodulated signal, 1 000 Hz (±0,1 Hz) above the carrier frequency to which the receiver is tuned.

Class of emission F1B

DSC with an analogue interface, unmodulated signal on the assigned frequency.

DSC with a digital interface, a signal on the assigned frequency, modulated as appropriate.

Frequency shift signal with ±85 Hz shift at 1 700 Hz with a 100 Baud pseudo random bit pattern.

Transmit: The normal test modulation shall be as follows:

Class of emission J3E

- the transmitter shall be modulated with a signal of 1 000 Hz ± 0,1 Hz. The 1 000 Hz signal shall be subtracted from the measured frequency to get the transmitter frequency.

Class of emission F1B with an analogue interface:

- the transmitter shall be modulated with a signal of 1 700 Hz ± 0,1 Hz.

Class of emission F1B with a digital interface:

- the digital input shall first be connected to a digital 0 and then to a digital 1.

4.6 Artificial Antennae (non-radiating test load)

Transmitters:

For the purpose of conformance testing, the transmitter, at the output of the antenna matching device, shall meet the requirements of the present document when connected to the artificial antennae listed below:

- frequency range 1 605 kHz to 4 000 kHz:
  - the artificial antenna shall consist of a resistance of 10 Ω and a capacitance of 250 pF connected in series;
- frequency range 4 MHz to 27,5 MHz:
  - the artificial antenna shall consist of a resistance of 50 Ω.

Receivers:

For the purpose of conformance testing, the receiver shall meet the requirements of the present document when connected to a test source, at the point at which the antenna is normally connected, having the following characteristics:

- the test signal shall be derived from a resistive source of 50 Ω except as permitted below;
  - alternatively, in the frequency range 1 605 kHz to 4 000 kHz, an artificial antenna consisting of a 10 Ω resistor in series with a 250 pF capacitor may be used.

5 Performance assessment

5.1 General

The provisions of EN 301 843-1 [1], clause 5.1 shall apply.

5.2 Equipment which can provide a continuous communication link

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

5.3 Equipment which does not provide a continuous communication link

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

5.4 Ancillary equipment

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

5.5 Equipment classification

Radiotelephone transmitters and receivers belong solely to the category of mobile marine radio equipment.

6 Performance criteria

The provisions of EN 301 843-1 [1], clause 6 shall apply.

The equipment shall meet the special performance criteria set out in clauses 6.1 to 6.4, as appropriate.

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

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

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

The provisions of EN 301 843-1 [1], clause 6.2 shall apply with the following modifications.

During the test sequence, degradation or loss of function or performance which is self-recoverable is allowed, but the EUT shall not unintentionally transmit or change actual operating state or stored data.

6.3 Performance criteria C applied to power supply failure

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

6.4 Performance check

The provisions of EN 301 843-1 [1], clause 6.4 shall apply with the modifications set out in clauses 6.4.1 and 6.4.2.

6.4.1 Transmitter

For the purpose of the present document, the term "performance check" shall be taken to mean the following measurements and limits:

- frequency error:
    - With the transmitter connected to an artificial antenna (see clause 4.6), the transmitter shall be tuned to the frequency 2 182 kHz for MF equipment or 8 291 kHz for MF/HF equipment and operated in J3E mode and shall be modulated with a signal of 1 000 Hz ± 0,1 Hz. The 1 000 Hz signal shall be subtracted from the measured frequency to get the transmitter frequency. The transmitter frequency shall be within ±10 Hz of the selected frequency.
- RF output power:
    - With the transmitter connected to an artificial antenna (see clause 4.6), the transmitter shall be tuned to the frequency 2 182 kHz for MF equipment or 8 291 kHz for MF/HF equipment and operated in J3E mode. The transmitter shall be modulated by a test signal consisting of two audio frequency tones, applied simultaneously to the microphone input, at frequencies of 1 100 Hz and 1 700 Hz. The level of the tones shall be adjusted so that they produce equal output power and it shall be possible to obtain an output power of greater than 60 W PEP.

6.4.2 Receiver

For the purpose of the present document, the term "performance check" shall be taken to mean the following measurements and limits:

- maximum usable sensitivity:
    - With the AGC operative, the receiver shall be adjusted to 2 182 kHz for MF equipment or 8 291 kHz for MF/HF equipment and operated in J3E mode. A test signal as specified in clause 4.5 shall be applied. The level of the input signal shall be adjusted until the SINAD at the audio output of the receiver is 20 dB, and the output power is at least the standard output power (see clause 3.1). The level of the input signal shall be not greater than +22 dBµV at 2 182 kHz or not greater than +17 dBuV at 8 291 kHz.

6.5 Performance criteria for equipment which does not provide a continuous communication link

The provisions of EN 301 843-1 [1], clause 6.5 shall apply.

6.6 Performance criteria for ancillary equipment tested on a stand alone basis

The provisions of EN 301 843-1 [1], clause 6.6 shall apply.

7 Applicability overview

7.1 Emission

7.1.1 General

EN 301 843-1 [1], table 1, contains the applicability of EMC emission measurements to the relevant ports of marine radio and/or associated ancillary equipment.

7.1.2 Special conditions

No special conditions shall apply to marine radiotelephone transmitters and receivers in the scope of the present document.

7.2 Immunity

7.2.1 General

EN 301 843-1 [1], table 2, contains the applicability of EMC immunity measurements to the relevant ports of marine radio and/or associated ancillary equipment.

7.2.2 Special conditions

The following special conditions set out in table 1, relate to the immunity test methods and performance criteria used in EN 301 843-1 [1], clause 9.

Table 1: Special conditions for EMC immunity tests

Reference to clauses in EN 301 843-1 [1]	Special product-related conditions, additional to or modifying the test conditions in EN 301 843-1 [1], clause 9
9.2.2: Test method; **Radio frequency electromagnetic field**	**Wanted RF input signal for the receiver under test:** A receiver RF input level as specified in clause 4.2.3 with normal test modulation (see clause 4.5) shall be used during the test.
9.5.2: Test method; **Radio frequency, Common mode**	**Wanted RF input signal for the receiver under test:** A receiver RF input level as specified in clause 4.2.3 with normal test modulation (see clause 4.5) shall be used during the test.

Annex A (informative): Examples of types of MF/HF marine radiotelephone equipment in the scope of the present document

The provisions of the present document apply to radiotelephone transmitters and receivers intended for operation in the maritime mobile service, and associated ancillary equipment, as set out in the following clause.

A.1 Radiotelephone transmitters and receivers for the maritime mobile service operating in the MF/HF bands

The present document applies to radiotelephone transmitters and receivers for fixed installation onboard ships and operating in the maritime MF and/or HF bands in the frequency range 1 605 kHz to 27,5 MHz and the associated ancillary equipment as defined in EN 300 373-2 [4] and EN 300 373-3 [7].

Annex B (informative): The EN title in the official languages

Language	EN title
Czech	
Danish	Elektromagnetisk kompatibilitet og radiofrekvensforhold; standard for elektromagnetisk kompatibilitet (EMC) for maritimt radioudstyr og tjenester, Del 5; Særlige vilkår for MF/HF radiosendere- og modtagere
Dutch	
English	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for marine radio equipment and services; Part 5: Specific conditions for MF/HF radiotelephone transmitters and receivers
Estonian	
Finnish	Sähkömagneettinen yhteensopivuus ja radiospektriasiat(ERM); Sähkömagneettinen yhteensopivuusstandardi (EMC) merenkulun radiolaitteille ja palveluille; Osa 2: Erityisvaatimukset MF/HF-radiopuhelimien lähettimille ja vastaanottimille
French	
German	Elektromagnetische Verträglichkeit und Funkspektrumangelegenheiten (ERM);Elektromagnetische Verträglichkeit (EMV) für Seefunkeinrichtungen und -dienste; Teil 2: Spezifische Bedingungen für Mittel- und Kurzwellen-Funktelefonsender und -empfänger
Greek	
Hungarian	
Icelandic	
Italian	
Latvian	
Lithuanian	
Maltese	
Polish	
Portuguese	
Slovak	
Slovenian	
Spanish	Compatibilidad electromagnética y cuestiones de espectro de Radiofrecuencia(ERM); Normas de Compatibilidad Electromagnética (EMC) para equipos de radio de uso marítimo; Parte 2: Condiciones específicas para radioteléfonos emisores y receptores operando en MF/HF
Swedish	Elektromagnetisk kompatibilitet och radio spektrum frågor (ERM); Elektromagnetisk kompatibel standard för marinradio utrustningar och tjänster. Del 5: Speciella krav för MF/HF radiotelefon sändare och mottagare

History

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