SLOVENSKI STANDARD
SIST EN 300 828:2000

01-april-2000

Elektromagnetna združljivost (EMC) in zadeve v zvezi z radijskim spektrom (ERM) - Elektromagnetna združljivost EMC za radijske telefonske oddajnike in sprejemnike za pomorske mobilne storitve, ki delujejo v pasovih VHF

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) for radiotelephone transmitters and receivers for the maritime mobile service operating in the VHF bands

Ta slovenski standard je istoveten z: **EN 300 828 Version 1.1.1**

ICS:

33.060.20	Sprejemna in oddajna oprema	Receiving and transmitting equipment
33.100.01	Elektromagnetna združljivost na splošno	Electromagnetic compatibility in general
47.020.70	Navigacijska in krmilna oprema	Navigation and control equipment

SIST EN 300 828:2000 **en**

EN 300 828 V1.1.1 (1998-03)

European Standard (Telecommunications series)

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) for radiotelephone transmitters and receivers for the maritime mobile service operating in the VHF bands

European Telecommunications Standards Institute

Reference

DEN/ERM-EMC-019 (7o000ico.PDF)

Keywords

EMC, maritime, radio, testing, VHF

ETSI Secretariat

Postal address

F-06921 Sophia Antipolis Cedex - FRANCE

Office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16
Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Internet

secretariat@etsi.fr
http://www.etsi.fr
http://www.etsi.org

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Foreword

This 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 Council Directive 83/189/EEC (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document, together with ETS 300 162, 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 as amended).

Technical specifications relevant to the EMC Directive are given in annex A.

National transposition dates	
Date of adoption of this EN:	6 February 1998
Date of latest announcement of this EN (doa):	31 May 1998
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 November 1998
Date of withdrawal of any conflicting National Standard (dow):	30 November 1998

1 Scope

The present document covers the assessment of radiocommunication and ancillary equipment in respect of ElectroMagnetic Compatibility (EMC). Technical specifications related to the antenna port and emissions for the enclosure port of the radio equipment are found in the related product standard ETS 300 162 [7] for the effective use of the radio spectrum.

The present document specifies the applicable EMC tests, the test methods, the limits and the minimum performance criteria for transmitters and receivers for fixed installation on board ships operating in the maritime VHF bands in the frequency range 156 MHz - 174 MHz, and the associated ancillary equipment.

The electromagnetic environment used in the present document to develop the technical specifications encompasses the electromagnetic environment on board ships as identified in EN 60945 [8].

The EMC requirements have been selected to ensure an adequate level of compatibility for apparatus in maritime environments. The levels do not cover extreme cases which may occur in any location but have a low probability of occurrence.

Compliance of radio equipment to the requirements of the present document does not signify compliance to any requirements related to the use of the equipment (i.e. licensing requirements).

Compliance to the present document does not signify compliance to any safety requirements. However, it is the responsibility of the assessor of the equipment that any observations regarding apparatus becoming dangerous or unsafe as a result of the application of the tests defined in the present document, shall be recorded in the test report.

The present document is based on the considerations and guidance as given in ETR 238 [9].

2 References

References may be made to:

a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or

b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or

c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or

d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] CISPR 16-1: "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1: Radio disturbance and immunity measuring apparatus".

[2] EN 61000-4-2: "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 2: Electrostatic discharge immunity test".

[3] EN 61000-4-4: "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 4: Electrical fast transient/burst immunity test".

[4] EN 61000-4-5: "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 5: Surge immunity test".

[5] EN 61000-4-6: "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 6: Immunity to conducted disturbances, induced by radio-frequency fields".

[6] EN 61000-4-3 (modified): "Electromagnetic Compatibility (EMC) - Part 4: Testing and measurement techniques - Section 3: Radiated, radio-frequency, electromagnetic field immunity test".

[7] ETS 300 162 (1997): "Radio Equipment and Systems (RES); Radiotelephone transmitters and receivers for the maritime mobile service operating in the VHF bands; Technical characteristics and methods of measurement".

[8] EN 60945: "Maritime navigational equipment - General requirements - Method of testing and required test results".

[9] ETR 238: "ETSI/CENELEC standardization programme for the development of Harmonized Standards related to Electro-Magnetic Compatibility (EMC) in the field of telecommunications".

[10] EN 55022 (1994): "Limits and methods of measurement of radio disturbance characteristics of information technology equipment".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

ancillary equipment: Equipment (apparatus), used in connection with a receiver, transmitter or transceiver is considered as an ancillary equipment (apparatus) if:

- the equipment is intended for use in conjunction with a receiver, transmitter or transceiver to provide additional operational and/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 stand alone basis to provide user functions independently of a receiver, transmitter or transceiver; and

- the receiver, transmitter or transceiver to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment, i.e. it is not a sub-unit of the main equipment essential to the main equipment basic functions.

artificial antenna: The antenna port(s) of the Equipment Under Test (EUT) shall be terminated with a non-radiating 50 Ω termination unless there is a requirement to apply a Radio Frequency (RF) input signal to the receiver antenna port.

enclosure port: The physical boundary of the apparatus onto which an electromagnetic field may radiate or impinge.

Equipment Under Test (EUT): The EUT comprises one or more units and their interconnecting cables as necessary for it to perform its intended functions.

port: A particular interface of specified equipment (apparatus) with the external electromagnetic environment.

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:

AC	Alternating Current
AM	Amplitude Modulation
DC	Direct Current
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
RF	Radio Frequency

4 General test conditions

This clause defines the general test configuration and is relevant for clauses 8 and 9.

4.1 Test conditions and configurations

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 as defined in ETS 300 162 [7].

The test configuration shall be as close as possible to normal intended use.

If the equipment is part of a system, or can be connected to ancillary equipment, then it shall be acceptable to test the equipment while connected to the minimum representative configuration of ancillary equipment necessary to exercise the ports.

Ports which in normal operation are connected shall be connected to an ancillary equipment or to a representative piece of cable correctly terminated to simulate the input/output characteristics of the ancillary equipment. RF input/output ports shall be correctly terminated.

If the equipment has a large number of ports, then a sufficient number shall be selected to simulate actual operation conditions and to ensure that all the different types of termination are tested.

Ports which are not connected to cables during normal intended operation, e.g. service connectors, programming connectors, temporary connectors etc. shall not be connected to any cables for the purpose of EMC testing. Where cables have to be connected to these ports, or interconnecting cables have to be extended in length in order to exercise the EUT, precautions shall be taken to ensure that the evaluation of the EUT is not affected by the addition or extension of these cables.

The test conditions, test configuration and mode of operation shall be recorded in the test report.

4.1.1 Emission tests

This subclause defines the test conditions and configurations for the emission tests as follows:

- the measurement shall be made in the operation mode producing the largest emission in the frequency band being investigated consistent with normal applications;
- an attempt shall be made to maximize the detected radiated emissions for example by moving the cables of the equipment.

4.1.2 Immunity tests

This subclause defines the test conditions and configurations for the immunity tests as follows:

- the measurement shall be made in the mode of operation as required in subclause 4.1.2.1;
- for the immunity tests of ancillary equipment without separate pass/fail criteria, the receiver, transmitter or transceiver coupled to the ancillary equipment, shall be used to judge whether the ancillary equipment passes or fails.

4.1.2.1 Mode of operation

For the immunity tests of transmitters, the transmitter shall be operated at its maximum rated output power, modulated with normal test modulation (subclauses 4.1.2.2 and 4.1.2.3).

For the immunity tests of receivers, the wanted input signal, coupled to the receiver, shall be modulated with normal test modulation (subclauses 4.1.2.2 and 4.1.2.5).

4.1.2.2 Normal test modulation

The normal test modulation shall be as follows:

- the receiver wanted 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;
- the transmitter shall be modulated with a sinusoidal audio frequency of 1 000 Hz and the deviation shall be ±3 kHz.

4.1.2.3 Arrangements for test signals at the input of the transmitter

The transmitter shall be modulated by a signal source capable of delivering normal test modulation.

4.1.2.4 Arrangements for test signals at the output of the transmitter

The transmitter output shall be connected to an artificial antenna. The measuring equipment for the wanted signal shall be located outside the test environment. Adequate measures shall be taken to avoid the effect of the unwanted signal on the measuring equipment.

4.1.2.5 Arrangements for test signals at the input of the receiver

Test signal sources shall be connected to the receiver input in such a way that the impedance presented to the receiver input is 50 Ω. The level of the wanted signal shall be 40 dBμV (emf) unless indicated otherwise.

Adequate measures shall be taken to avoid the effect of the unwanted signal on the measuring equipment.

4.1.2.6 Arrangements for test signals at the output of the receiver

The output of the receiver shall be coupled to the test equipment outside the test environment. If the equipment has an output connector/port then this port shall be used to connect the test equipment outside the test environment. Precautions shall be taken to ensure that any effect on the test is minimized.