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**Elektromagnetna združljivost (EMC) in zadeve v zvezi z radijskim spektrom (ERM) - Standard elektromagnetne združljivosti (EMC) za pomorske radijske telefonske nadzorne (opazovalne) sprejemnike, ki delujejo na 2 182 kHz**

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for maritime radiotelephone watch receivers operating on 2 182 kHz

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*European Standard (Telecommunications series)*

## **Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for maritime radiotelephone watch receivers operating on 2 182 kHz**

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# Contents

Intellectual Property Rights .....	5
Foreword .....	5
1 Scope .....	6
2 Normative references .....	6
3 Definitions and abbreviations .....	7
3.1 Definitions .....	7
3.2 Abbreviations .....	7
4 General test conditions .....	8
4.1 Test conditions and configurations .....	8
4.1.1 Emission tests .....	8
4.1.2 Immunity tests .....	9
4.1.2.1 Mode of operation .....	9
4.1.2.2 Normal test signal .....	9
4.1.2.3 Arrangements for test signals at the input of the receiver .....	9
4.1.2.4 Receiver exclusion band .....	9
4.1.2.5 Narrow band responses .....	9
5 Performance assessment .....	10
5.1 General .....	10
5.2 Ancillary equipment .....	10
6 Performance criteria .....	10
6.1 General .....	10
6.2 Performance criteria A for continuous phenomena .....	10
6.3 Performance criteria B for transient phenomena .....	10
6.4 Performance criteria C .....	10
6.5 Performance check .....	11
7 Applicability overview tables .....	11
7.1 Emissions .....	11
7.2 Immunity .....	12
8 Methods and limits for emission measurements .....	12
8.1 Radiated emissions .....	12
8.1.1 Definition .....	12
8.1.2 Test method, general .....	13
8.1.2.1 Test method, frequency range 150 kHz to 30 MHz .....	13
8.1.2.2 Test method, frequency range 30 MHz to 1 GHz .....	13
8.1.3 Limits .....	14
8.2 Power ports .....	14
8.2.1 Definition .....	14
8.2.2 Test method .....	15
8.2.3 Limits .....	15
8.3 Radiated spurious emissions of the enclosure port of the radio equipment .....	17
8.3.1 Definition .....	17
8.3.2 Method of Measurement .....	17
8.3.3 Limits .....	17
9 Test methods and levels for immunity tests .....	17
9.1 Radio frequency electromagnetic field (80 MHz to 1 000 MHz) .....	17
9.1.1 Definition .....	17
9.1.2 Test method .....	17
9.1.3 Performance criteria .....	17
9.2 Electrostatic discharge (ESD) .....	18
9.2.1 Definition .....	18

9.2.2	Test method .....	18
9.2.3	Performance criteria .....	18
9.3	Fast transient, differential and common mode .....	18
9.3.1	Definition .....	18
9.3.2	Test method .....	18
9.3.3	Performance criteria .....	18
9.4	Conducted disturbances induced by RF-fields in the frequency range 150 kHz to 80 MHz.....	19
9.4.1	Definition .....	19
9.4.2	Test method.....	19
9.4.3	Performance criteria .....	19
9.5	Power supply short term variations.....	20
9.5.1	Definition .....	20
9.5.2	Test method .....	20
9.5.3	Performance criteria .....	20
9.6	Power supply failure .....	20
9.6.1	Definition .....	20
9.6.2	Test method .....	20
9.6.3	Performance criteria .....	20
9.7	Surge.....	20
9.7.1	Definition .....	21
9.7.2	Test method .....	21
9.7.3	Performance criteria .....	21

<b>Annex A (normative):</b>	<b>Subclauses of the present document relevant for compliance with the essential requirements of EC Council Directives.....</b>	<b>22</b>
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History .....	23
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## Foreword

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

Other standards cover radiocommunications equipment not listed in the scope.

The present document is based upon EN 60945 [10].

The present EN 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 EN, together with ETS 300 441 [9] 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 [8] as amended).

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

### National transposition dates

Date of adoption of this EN:	18 September 1998
Date of latest announcement of this EN (doa):	31 December 1998
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 June 1999
Date of withdrawal of any conflicting National Standard (dow):	31 December 2001

# 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 are found in the related product standard ETS 300 441 [9] 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 maritime radiotelephone watch receivers operating on 2 182 kHz 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 [10].

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.

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, should be recorded in the test report.

# 2 Normative 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 55022: "Limits and methods of measurement of radio disturbance characteristics of information technology equipment".
- [3] EN 61000-4-2: "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 2: Electrostatic discharge immunity test".
- [4] EN 61000-4-4 (1995): "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 4: Electrical fast transient/burst immunity test".
- [5] EN 61000-4-5 (1995): "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 5: Surge immunity test".
- [6] EN 61000-4-6: "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 6: Immunity to conducted disturbances, induced by radio-frequency fields".
- [7] EN 61000-4-3 (1995): "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 3: Radiated, radio-frequency, electromagnetic field immunity test".



- [8] 89/336/EEC: "Council Directive on approximation of the laws of the Member States relating to electromagnetic compatibility".
- [9] ETS 300 441: "Radio Equipment and Systems (RES); Technical characteristics and methods of measurement for maritime radiotelephone watch receivers for the distress and calling frequency 2 182 kHz".
- [10] EN 60945: "Marine navigational equipment - General requirements - Methods of testing and required test results".
- [11] ETS 300 113: "Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment intended for the transmission of data (and speech) and having an antenna connector".

## 3 Definitions 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:** A non-radiating load of 10  $\Omega$  in series with 250 pF.

**signal & control port:** A port which carries information or control signals, excluding antenna ports.

**antenna port:** A port which is intended for direct or indirect connection to an antenna.

**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.

**rated output power:** The value stated by the manufacturer to be the maximum power available at the receiver output, for which certain requirements are met.

### 3.2 Abbreviations

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

EMC	ElectroMagnetic Compatibility
IMO	International Maritime Organization
SOLAS	Safety Of Life At Sea
EUT	Equipment Under Test
RF	Radio Frequency
AC	Alternating Current

DC	Direct Current
emf	electromotive force
rms	root mean square
SND/N	Signal + Noise + Distortion / Noise

## 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 normal temperature and humidity with the equipment connected to the normal power supply voltage. All tests shall be performed with the wanted signal on the operating frequency 2 182 kHz unless otherwise stated.

The normal temperature and humidity conditions shall be a combination of temperature and humidity within the following ranges:

temperature: +15°C to +35°C;

relative humidity: 20 % to 75 %.

The normal test voltage for equipment to be connected to the AC mains, shall be the nominal mains voltage. The frequency of the test voltage shall be 50 Hz  $\pm$  1 Hz.

The normal test voltage for equipment to be connected to a battery, shall be the nominal voltage of the battery (12 V, 24 V, etc.). For operation from other power sources, the normal test voltage shall be declared by the manufacturer.

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 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, the wanted input signal, coupled to the receiver, shall be the normal test signal a) (subclause 4.1.2.2) except where otherwise stated.

For immunity tests requiring performance criterion A, the EUT shall be put in the non-muted state before the test.

For immunity tests requiring performance criteria B or C, the EUT shall be put in the muted state before the test.

### 4.1.2.2 Normal test signal

The following normal test signals are defined:

- a) an A2A signal on the frequency of 2 182 kHz with a level of 60 dB $\mu$ V (emf) modulated with 1 kHz to a depth of 30 %;
- b) an A2A signal on the frequency of 2 182 kHz with a level of 60 dB $\mu$ V (emf) modulated with the radiotelephone alarm signal (see ETS 300 441 [9]) to a depth of 70 %.

### 4.1.2.3 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  $\Omega$ .

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

### 4.1.2.4 Receiver exclusion band

The exclusion band is the frequency range 2 065 kHz to 2 300 kHz.

### 4.1.2.5 Narrow band responses

Responses occurring during the test at discrete frequencies which are narrow band responses (spurious responses) are identified by the method specified in this subclause.

If an unwanted signal causes an SND/N of less than 10 dB it is necessary to establish whether the distortion is due to a narrowband response or to wideband phenomena.

Taking the initial test frequency as reference the procedure is repeated with an increase of the unwanted signal frequency by 40 kHz.

If the SND/N recovers to not less than 10 dB, then the response is considered as a narrowband response.

If the SND/N is still less than 10 dB, the test is repeated with the frequency of the unwanted signal decreased by 40 kHz.

If the SND/N recovers to not less than 10 dB, the response is considered as a narrowband response.

If the SND/N is still less than 10 dB, this may be due to the fact that the offset has made the frequency of the unwanted signal correspond to the frequency of another narrowband response.

Therefore, taking the initial test frequency as reference the procedure is repeated with an increase of the unwanted signal frequency by 50 kHz.