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**Elektromagnetna združljivost (EMC) in zadeve v zvezi z radijskim spektrom (ERM) - Elektromagnetna združljivost (EMC) za pomorske mobilne zemeljske postaje, ki zagotavljajo podatkovne komunikacije majhnih bitnih hitrosti (LBRDC) za globalni pomorski zasilni in varnostni sistem (GMDSS), ki deluje v pasovih 1,5/1,6 GHz**

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) for Maritime Mobile Earth Stations (MMES) operating in the 1,5/1,6 GHz bands providing Low Bit Rate Data Communications (LBRDC) for the Global Maritime Distress and Safety System (GMDSS)

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*European Standard (Telecommunications series)*

**Electromagnetic compatibility  
and Radio spectrum Matters (ERM);  
ElectroMagnetic Compatibility (EMC)  
for Maritime Mobile Earth Stations (MMES)  
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***ETSI Secretariat***

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**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  
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**Internet**

secretariat@etsi.fr

<http://www.etsi.fr>

<http://www.etsi.org>

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Pursuant to the ETSI Interim IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETR 314 (or the updates on <http://www.etsi.fr/ipr>) which are, or may be, or may become, essential to the present document.

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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 300 460, 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).

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

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# 1 Scope

The present document covers the assessment of Inmarsat-C Global Maritime Distress and Safety System (GMDSS) and Enhanced Group Call (EGC) Ship Earth Stations, as defined by the International Maritime Organization (IMO) to be used for Low Bit Rate Data Communications (LBRDC) in the GMDSS, 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 300 460 [11] 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 Ship Earth Stations for the maritime mobile service operating in the Maritime Mobile Satellite Service (MMSS) bands.

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 [13].

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, are recorded in the test report.

The present document is based on the consideration and guidance as given in ETR 238 [12].

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# 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 55022 (1994): "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 61000-4-11: "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 11: Voltage dips, short interruptions and voltage variations immunity tests".



- [5] EN 61000-4-4: "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 4: Electrical fast transient/burst immunity test".
- [6] EN 61000-4-5: "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 5: Surge immunity test".
- [7] EN 61000-4-6: "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 6: Immunity to conducted disturbances, induced by radio-frequency fields".
- [8] EN 61000-4-3 (modified): "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 3: Radiated, radio-frequency, electromagnetic field immunity test".
- [9] 89/336/EEC: "Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility".
- [10] 92/31/EEC: "Council Directive amending Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility".
- [11] ETS 300 460: "Satellite Earth Stations and Systems (SES); Maritime Mobile Earth Stations (MMESs) operating in the 1,5/1,6 GHz bands providing Low Bit Rate Data Communications (LBRDC) for the Global Maritime Distress and Safety System (GMDSS); Technical characteristics and methods of measurement".
- [12] ETR 238: "ETSI/CENELEC standardization programme for the development of Harmonized Standards related to Electro-Magnetic Compatibility (EMC) in the field of telecommunications".
- [13] EN 60945: "Maritime navigational equipment - General requirements - Method of testing and required test results".
- [14] EN 50081-1 (1992): "Electromagnetic compatibility - Generic emission standard - Part 1: Residential, commercial and light industry".
- [15] EN 50082-1 (1993): "Electromagnetic compatibility - Generic immunity standard - Part 1: Residential, commercial and light industry".

## 3 Definitions and abbreviations

### 3.1 Definitions

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

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

- the equipment is intended for use in conjunction with a receiver 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 or transceiver; and
- the receiver 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 basic functions.

**artificial antenna:** The antenna port(s) of the EUT shall be terminated with a power attenuator of adequate power absorption capability unless there is a requirement to apply an RF input signal to the receiver antenna port.

**class 0:** A stand alone EGC receiver.

**class 1:** A basic ship earth station providing ship-to-shore and shore-to-ship message transfer.

**class 2:** As for class 1 but with EGC as an alternative to shore-to-ship transfer using a shared receiver.

**class 3:** As for class 1 but with EGC using an independent receiver.

**enclosure port:** The physical boundary of the apparatus onto which an electromagnetic field may impinge or from which an electromagnetic field may be radiated.

**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.

**ship earth station:** A maritime mobile earth station operating in the GMDSS.

NOTE: The term "ship earth station" is used in the present document to align with IMO terminology.

## 3.2 Abbreviations

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

AC	Alternating Current
AM	Amplitude Modulation
CW	Continuous Wave
DC	Direct Current
EGC	Enhanced Group Call
EMC	ElectroMagnetic Compatibility
emf	electromotive force
EUT	Equipment Under Test
GMDSS	Global Maritime Distress and Safety System
IMO	International Maritime Organization
LBRDC	Low Bit Rate Data Communication
MMES	Maritime Mobile Earth Station
MMSS	Maritime Mobile Satellite Service
RF	Radio Frequency
rms	root mean squared
STE	Special Test Equipment

## 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 equipment shall be tested under normal test conditions.

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    25 % - 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/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 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 emission for example by moving the cables of the equipment.

For the purpose of the emission tests, the EUT may be provided with a test facility to activate the transmitter without reception of enabling signals from the STE.

The details of the test facility shall be recorded in the test report.

#### 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 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 normal RF output power, modulated with normal modulation.

For the immunity test of receivers, the wanted input signal coupled to the receiver shall be modulated with normal modulation.

##### 4.1.2.2 Special Test Equipment

The Special Test Equipment (STE) shall be supplied by the manufacturer or system provider. Since this test equipment will be specific for the particular system, it is not possible to provide detailed specifications in the present document. However the following requirements apply:

- STE shall simulate the satellite signal, thus enabling the ship earth station to transmit to allow measurements of transmission parameters;
- any specification of the STE which may have direct or indirect effects on any specification of the present document shall be clearly stated by the manufacturer;