SLOVENSKI STANDARD
SIST EN 300 279:2000

01-julij-2000

Elektromagnetna združljivost (EMC) in zadeve v zvezi z radijskim spektrom (ERM) - Standard elektromagnetne združljivosti (EMC) za zasebni kopenski mobilni radio (PMR) in pomožno opremo (govorno oziroma negovorno)

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for Private land Mobile Radio (PMR) and ancillary equipment (speech and/or non-speech)

Ta slovenski standard je istoveten z: **EN 300 279 Version 1.2.1**

ICS:

33.100.20 Imunost Immunity

SIST EN 300 279:2000 **en**

EN 300 279 V1.2.1 (1999-02)

European Standard (Telecommunications series)

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for Private land Mobile Radio (PMR) and ancillary equipment (speech and/or non-speech)

Reference
REN/ERM-EMC-017 (2l000ioo.PDF)

Keywords
EMC, mobile, PMR, radio

ETSI

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
Individual copies of this ETSI deliverable
can be downloaded from
http://www.etsi.org
If you find errors in the present document, send your
comment to: editor@etsi.fr

Contents

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available **free of charge** from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://www.etsi.org/ipr).

Pursuant to the ETSI 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 SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

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

The present document covers both analogue and digital equipment.

The present document, with one or more of the relevant following: ETS 300 086, ETS 300 113, ETS 300 296, ETS 300 341, ETS 300 390 and EN 301 166, is intended to become a Harmonized EMC Standard, the reference of which is intended to be published in the Official Journal of the European Communities referencing Council Directive 89/336/EEC (EMC Directive).

The present document is intended to become a Harmonized EMC Standard for equipment within the scope of I-ETS 300 219.

The technical specifications which are relevant to the EMC Directive are listed in annex A and annex B for I-ETS 300 219.

Annex C contains the ERC Decision which references the technical specifications in the present document for inclusion in national type approval regulations.

For equipment which can be connected to the ac mains supply, the requirements of EN 61000-3-2 and EN 61000-3-3 apply where appropriate from 1-1-2001.

National transposition dates	
Date of adoption of this EN:	22 January 1999
Date of latest announcement of this EN (doa):	30 April 1999
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 October 1999
Date of withdrawal of any conflicting National Standard (dow):	30 April 2002

1 Scope

The present document covers the assessment of radiocommunications and ancillary equipment in respect of ElectroMagnetic Compatibility (EMC). Technical specifications related to the antenna port and emissions for the enclosure port of radio equipment are found in the related product standards 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 Private land Mobile Radio (PMR) equipment using analog and/or digital modulation technique (speech and/or non-speech) operating in the frequency range 30 MHz to 1 000 MHz, and the associated ancillary equipment.

The environmental classification used in the present document refers to the environment classification used in the Generic Standards EN 50081-1 [3], EN 50082-1 [4], except for the vehicular environment class which refers to ISO 7637 [12].

The EMC requirements have been selected to ensure an adequate level of compatibility for apparatus at residential, commercial, light industrial and vehicular environments. The levels do not cover extreme cases which may occur in any location but have a low probability of occurrence.

The present document may not cover those cases where a potential source of interference which is producing individually repeated transient phenomena or a continuous phenomena is permanently present, e.g. a radar or broadcast site in the near vicinity. In such a case it may be necessary to use special protection applied to either the source of interference or the interfered part or both.

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 of the present document, should be recorded in the test report.

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, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, 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.

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 Publication No. 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 50081-1 (1992): "Electromagnetic compatibility - Generic emission standard - Part 1: Residential, commercial and light industry".

[4] EN 50082-1 (1998): "Electromagnetic compatibility - Generic immunity standard - Part 1: Residential, commercial and light industry".

[5] EN 61000-4-1 (1994): "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 1: Overview of immunity tests".

[6] EN 61000-4-2 (1995): "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 2: Electrostatic discharge immunity test".

[7] EN 61000-4-3 (1997): "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 3: Radiated, radio-frequency, electromagnetic field immunity test".

[8] EN 61000-4-4 (1995): "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 4: Electrical fast transient/burst immunity test".

[9] EN 61000-4-5 (1995): "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 5: Surge immunity test".

[10] EN 61000-4-6 (1996): "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 6: Immunity to conducted disturbances, induced by radio-frequency fields ".

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

[12] ISO 7637 (1990): "Road vehicles-Electrical disturbance by conduction and coupling;
Part 1: Passenger cars and light commercial vehicles with nominal 12 V supply voltage"; and
"Part 2: Commercial vehicles with nominal 24 V supply voltage - Electrical transient conduction along supply lines only".

[13] I-ETS 300 219 (1993): "Radio Equipment and systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment transmitting signals to initiate a specific response in the receiver".

3 Definitions and abbreviations

3.1 Definitions

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

This type of radiocommunications equipment (apparatus) is used in a fixed, mobile or a portable application.

radiocommunications equipment: an apparatus which includes one or more transmitters and/or receivers and/or parts thereof.

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.

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

integral antenna: an antenna designed to be connected directly to the equipment with or without the use of an external connector and considered to be part of the equipment. An integral antenna may be fitted internally or externally to the equipment.

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

3.2 Abbreviations

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

ac	alternating current
BER	Bit Error Ratio
CR	Continuous phenomena applied to Receivers
CT	Continuous phenomena applied to Transmitters
dc	direct current
EUT	Equipment Under Test
LISN	Line Impedance Stabilizing Network
PMR	Private land Mobile Radio
TR	Transient phenomena applied to Receivers
TT	Transient phenomena applied to Transmitters

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 conditions which are within the manufacturer's declared range of humidity, temperature and supply voltage.

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

Where portable (handheld) equipment is provided with a detachable integral antenna, it shall be tested with the antenna fitted in a manner typical of normal intended use, unless specified otherwise.

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 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 impedance 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 Equipment Under Test (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 tests shall be carried out at a point within the specified normal operating environmental range at the rated supply voltage for the equipment.

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.

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). A communication link shall be established (subclause 4.1.2.4) at the start of the test and maintained during the test.

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). A communication link shall be established (subclause 4.1.2.6) at the start of the test and maintained during the test.

For the immunity tests of duplex transceivers, the EUT may be configured in the repeater mode, consistent with the conditions given above.

4.1.2.2 Normal test modulation

For analogue speech equipment:

Angle modulated equipment:

- 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 to a deviation of 60 % peak system;
- the transmitter of the EUT shall be modulated with a sinusoidal audio frequency of 1 000 Hz at a deviation of 60 % peak system deviation.

Non-angle modulated equipment:

- the receiver wanted input signal shall be set to the nominal frequency of the receiver suitably modulated with a sinusoidal audio frequency of 1 000 Hz, which represents normal operation;
- the transmitter of the EUT shall be suitably modulated with a sinusoidal audio frequency of 1 000 Hz, which represents normal operation;
- details concerning the modulation used shall be recorded in the test report.

For digital speech equipment:

- the receiver wanted input signal shall be set to the nominal frequency of the receiver modulated with a test signal specified by the manufacturer which represents normal operation which is in accordance with the appropriate radio product standard;
- the transmitter shall be modulated with a test signal which represents normal operation as specified by the manufacturer which is in accordance with the appropriate radio product standard;
- the manufacturer may have to supply the test modulation/de-modulation equipment;
- details concerning the modulation used shall be recorded in the test report.

For non-speech equipment (data, specific response, etc.):

- the receiver wanted input signal shall be set to the nominal frequency of the receiver modulated with a test signal specified by the manufacturer which represents normal operation which is in accordance with the appropriate radio product standard;
- the transmitter shall be modulated with a test signal which represents normal operation as specified by the manufacturer which is in accordance with the appropriate radio product standard;
- the manufacturer may have to supply the test modulation/de-modulation equipment;
- details concerning the modulation used shall be recorded in the test report.

The test signal generator (modulation) shall be able to produce a continuous stream of data or a repetitive message.

The test signal receiver (de-modulator) shall be, where appropriate, able to produce a readout of Bit Error Ratio (BER) of a continuous data stream or a repetitive readout of message acceptance.

4.1.2.3 Arrangements for test signals at the input of the transmitter

The transmitter shall be modulated with normal test modulation, by an internal or external signal source capable of delivering the normal test modulation.

4.1.2.4 Arrangements for test signals at the output of the transmitter

For equipment without an antenna connector, the wanted signal to establish a communication link shall be delivered from the equipment to an antenna located within the test environment. The measuring equipment for the wanted signal shall be located outside of the test environment. Adequate measures shall be taken to avoid the effect of the unwanted signal on the measuring equipment.

For equipment with an antenna connector, the wanted signal to establish a communication link shall be delivered from the antenna connector by a coaxial cable. The measuring equipment for the wanted signal shall be located outside of 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

For equipment without an antenna connector, the wanted input signal to establish a communication link shall be presented to the equipment from an antenna located within the test environment. It shall be approximately 40 dB above the minimum level necessary to achieve the performance criteria, measured while the power amplifiers generating the EMC disturbance are switched on but without excitation. This level of the wanted input signal is expected to represent a normal operation signal level and should be sufficient to avoid the broad band noise from the power amplifiers generating the EMC disturbance from influencing the measurement. The source of the wanted input signal shall be located outside of the test environment.

For equipment with an antenna connector, the wanted input signal to establish a communication link shall be presented to the antenna connector by a coaxial cable. The source of the wanted input signal shall be located outside of the test environment and shall be approximately 40 dB above the minimum level necessary to achieve the performance criteria, measured while the power amplifiers generating the EMC disturbance are switched on but without excitation.

4.1.2.6 Arrangements for test signals at the output of the receiver

For speech equipment the audio frequency output of the equipment should be coupled via an electrically non-conductive acoustic tube to an audio distortion meter or other measuring equipment outside of the test environment. Where it is not practical to use an electrically non-conductive acoustic tube, then other means of connecting the receiver output to an audio distortion meter or other measuring equipment shall be provided and recorded in the test report. Precautions shall be taken to ensure that any effect on the test is minimized.

For non-speech equipment the output of the receiver shall be coupled via an electrically non-conductive means to the test equipment outside the test environment. If the equipment has an output connector or port providing the receiver output then this port shall be used via a cable, consistent with the standard cable used in normal operation, connected to the test equipment outside the test environment. The test equipment may be supplied by the manufacturer. Precautions shall be taken to ensure that any effect on the test is minimized.

4.1.2.7 Receiver and receivers of transceivers exclusion band

The exclusion band for 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, which ever 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.