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Electromagnetic compatibility and Radio spectrum Matters (ERM); Radio telephone transmitters and receivers for the maritime mobile service operating in the VHF bands used on inland waterways; Part 1: Technical characteristics and methods of measurement

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**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Radio telephone transmitters and receivers
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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 is part 1 of a multi-part deliverable covering the Electromagnetic compatibility and Radio Spectrum Matters (ERM); Radio telephone transmitters and receivers for the maritime mobile service operating in the VHF bands used on inland waterways, as identified below:

- Part 1:** "Technical characteristics and methods of measurement";
- Part 2: "Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 3: "Harmonized EN covering essential requirements of article 3.3 (e) of the R&TTE Directive".

National transposition dates

Date of adoption of this EN:	21 November 2003
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Introduction

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [9] laying down a procedure for the provision of information in the field of technical standards and regulations.

1 Scope

The present document lays down the minimum requirements for VHF radio transmitters and receivers operating on board ships in frequency bands allocated to the maritime mobile service, used on inland waterways as defined by Regional Agreements or responsible Administrations.

The present document applies to VHF transmitters and receivers fitted with a 50 Ω external antenna socket or connector for use on board ships on inland waterways and operating in the bands between 156 MHz and 174 MHz allocated to the maritime mobile service by the Radio Regulations [1], Appendix 18.

For countries where the Automatic Transmitter Identification System (ATIS) is mandatory, the requirements of annex B apply.

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] ITU Radio Regulations (2001).
- [2] ITU-T Recommendation E.161 (2001): "Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network".
- [3] ETSI EN 300 338: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Technical characteristics and methods of measurement for equipment for generation, transmission and reception of Digital Selective Calling (DSC) in the maritime MF, MF/HF and/or VHF mobile service".
- [4] IEC 61162-1: "Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners".
- [5] ISO 694: "Ships and marine technology - Positioning of magnetic compasses in ships".
- [6] ETSI TR 100 028 (all parts): "ElectroMagnetic Compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [7] ITU-T Recommendation O.41 (1994): "Psophometer for use on telephone-type circuits".
- [8] ITU-R Recommendation M.493-10 (2000): "Digital selective-calling system for use in the maritime mobile service".
- [9] Council 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.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the Radio Regulations [1] apply.

3.2 Abbreviations

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

ad	amplitude difference
ATIS	Automatic Transmitter Identification System
DSC	Digital Selective Calling
DX	first transmission
emf	electromotive force
fd	frequency difference
RF	Radio Frequency
rms	root mean square
RX	re-transmission
SINAD	Signal + Noise + Distortion/Noise + Distortion
VSWR	Voltage Standing Wave Ratio

4 General requirements

4.1 Construction

The mechanical and electrical construction and finish of the equipment shall conform in all respects to good engineering practice, and the equipment shall be suitable for use on board ships.

All controls shall be of sufficient size to enable the usual control functions to be easily performed and the number of controls should be the minimum necessary for simple and satisfactory operation.

For the purpose of conformance testing, relevant technical documentation shall be supplied with the equipment.

The VHF maritime mobile service uses both single-frequency and two-frequency channels. For two-frequency channels the Radio Regulations require a separation of 4,6 MHz between the transmitting frequency and the receiving frequency.

The equipment shall be capable of operating on single frequency and two-frequency channels with manual control (simplex). It may also be capable of operating on two-frequency channels without manual control (duplex).

No scanning or multiple watch facilities shall be implemented.

The equipment shall be able to operate on all channels defined in the Radio Regulations [1], Appendix 18.

Operation on channels 75 and 76 shall be limited to an output power of 1 W by appropriate means. Additional VHF channels outside those defined by the Radio Regulations Appendix 18 [1] may also be provided, but means shall be provided to block any or all of these additional channels, as may be required by the licence before installation on board vessels. It shall not be possible for the user to unblock any blocked channels.

The equipment shall be so designed that use of channel 70 for purposes other than DSC is prevented, and that use of channels AIS1 and AIS2 for purposes other than AIS is prevented.

The possibility to apply automatic power reduction to any of these channels shall be available. It shall not be possible for the user to change the programmed settings of these channels.

The output power shall be automatically limited to a value between 0,5 W and 1 W on the following channels:

- 6, 8, 10, 11, 12, 13, 14, 15, 17, 71, 72, 74, 75, 76 and 77.

It shall not be possible to transmit while any frequency synthesizer used within the transmitter is out of lock.

It shall not be possible to transmit during channel switching operations.

4.2 Controls and indicators

The equipment shall have a channel selector and shall indicate the designator, as shown in the Radio Regulations [1], Appendix 18, of the channel at which the installation is set. The channel designator shall be legible irrespective of the external lighting conditions.

Channel 16 shall be distinctively marked. Selection of channel 16, shall be preferably by readily accessible means (e.g. a distinctively marked key). Selection of channel 16 by any means shall automatically set the transmitter output power to maximum. This power level may subsequently be reduced by manual user control if required.

Where an input panel on the equipment for entering the digits 0 - 9 is provided, this shall conform to ITU-T Recommendation E.161 [2].

The equipment shall have the following additional controls and indicators:

- an on/off switch for the entire installation with a visual indication that the installation is in operation;
- a manual non-locking push to talk switch to operate the transmitter;
- a manual switch for reducing the transmitter output power to a value between 0,5 W and 1 W;
- an audio frequency power volume control not affecting the audio level of the handset;
- a squelch control;
- a control for reducing the brightness of the equipment illumination to zero;
- an output power detector giving a visual indication that the carrier is being produced.

The equipment shall also meet the following requirements:

- the user shall not have access to any control which, if wrongly set, might impair the technical characteristics of the equipment;
- if the accessible controls are located on a separate console and if there are two or more control consoles, one of the consoles shall have priority over the others. If there are two or more control consoles, the operation of one console shall be indicated on the other consoles.

4.3 Handset and loudspeaker

The equipment shall be fitted with an integral loudspeaker and/or a socket for an external loudspeaker and shall have the facility to be fitted with a telephone handset or a microphone.

During transmission in simplex operation the receiver output shall be muted.

During transmission in duplex operation, only the handset shall be operative. Measures shall be taken to ensure correct operation when duplex is used and precautions shall be taken to prevent harmful electrical or acoustic feedback which might produce oscillations.

4.4 Switching time

The channel switching arrangement shall be such that the time necessary to change over from using one of the channels to using any other channel does not exceed 5 s.

The time necessary to change over from transmission to reception or vice versa, shall not exceed 0,3 s.

4.5 Safety precautions

Measures shall be taken to protect the equipment against the effects of overcurrent or overvoltage.

Measures shall be taken to prevent damage to the equipment if the electrical power source produces transient voltage variations and to prevent any damage that might arise from an accidental reversal of polarity of the electrical power source.

Means shall be provided for earthing exposed metallic parts of the equipment but this shall not cause any terminal of the source of electrical energy to be earthed.

All components and wiring in which the dc or ac voltage (other than radio-frequency voltage) produce, singly or in combination, peak voltages in excess of 50 V shall be protected against any accidental access and shall be automatically isolated from all electrical power sources if the protective covers are removed. Alternatively, the equipment shall be constructed in such a way as to prevent access to components operating at such voltages unless an appropriate tool is used such as a nut-spanner or screwdriver. Conspicuous warning labels shall be affixed both inside the equipment and on the protective covers.

No damage to the equipment shall occur when the antenna port is placed on open circuit or short circuit for a period of at least 5 minutes in each case.

In order to provide protection against damage due to the build up of static voltages at the antenna port, there shall be a dc path from the antenna port to chassis not exceeding 100 k Ω .

The information in any volatile memory device shall be protected from interruptions in the power supply of up to 60 s duration.

4.6 Class of emission and modulation characteristics

The equipment shall use phase modulation, G3E (frequency modulation with a pre-emphasis of 6 dB/octave) for speech, and G2B for ATIS and DSC signalling where provided.

The equipment shall be designed to operate with a channel separation of 25 kHz.

The frequency deviation (G3E) corresponding to 100 % modulation shall be 5 kHz as nearly as practicable.

4.7 Facilities for DSC transmission and reception

VHF transmitters and receivers with an integral DSC modem or to be used with an external DSC modem shall also be tested in accordance with EN 300 338 [3] for DSC equipment.

VHF transmitters and receivers to be used for DSC shall also comply with the following:

- a) the DSC facility shall be capable of operating on at least channel 70;
- b) if the equipment is designed for connection of an external modem to the audio frequency port, the input and output impedances should be 600 Ω free of earth;
- c) if the equipment is designed for connection to an external DSC modem with binary inputs and outputs for DSC signals, the logic level and the appropriate functions shall comply with IEC 61162-1 [4].

4.8 Labelling

All controls, instruments, indicators and ports shall be clearly labelled.

Details of the power supply from which the equipment is intended to operate shall be clearly indicated on the equipment.

The equipment shall be clearly marked on the exterior with the identification of the manufacturer, type designation of the equipment, and the serial number of the unit.

The compass safe distance (ISO 694 [5], Method B) shall be stated on the equipment or in the technical manual.

4.9 Warm up

After being switched on the equipment shall be operational within 1 minute.

5 Test conditions, power sources and ambient temperatures

5.1 Normal and extreme test conditions

Conformance tests shall be made under normal test conditions and also, where stated, under extreme test conditions (clauses 5.4.1 and 5.4.2 applied simultaneously).

5.2 Test power source

During conformance testing, the equipment shall be supplied from a test power source capable of producing normal and extreme test voltages as specified in clauses 5.3.2 and 5.4.2.

The internal impedance of the test power source shall be low enough for its effect on the test results to be negligible. For the purpose of testing the power source voltage shall be measured at the power input port of the equipment.

During testing, the power source voltages shall be maintained within a tolerance of $\pm 3\%$ relative to the voltage level at the beginning of each test.

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5.3 Normal test conditions

5.3.1 Normal temperature and humidity

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

- temperature: $+15^{\circ}\text{C}$ to $+35^{\circ}\text{C}$;
- relative humidity: 20 % to 75 %.

5.3.2 Normal power sources

5.3.2.1 Mains voltage and frequency

The normal test voltage for equipment to be connected to the ac mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage or any of the declared voltages for which the equipment is indicated as having been designed. The frequency of the test voltage shall be $50\text{ Hz} \pm 1\text{ Hz}$.

5.3.2.2 Battery power source

Where the equipment is designed to operate from a battery, the normal test voltage shall be the nominal voltage of the battery (12 V, 24 V etc.).

5.3.2.3 Other power sources

For operation from other power sources the normal test voltage shall be that declared by the manufacturer.

5.4 Extreme test conditions

5.4.1 Extreme temperatures

For tests at extreme temperatures, measurements shall be made in accordance with clause 5.5, at a lower temperature of $-15^{\circ}\text{C} \pm 3^{\circ}\text{C}$ and an upper temperature of $+55^{\circ}\text{C} \pm 3^{\circ}\text{C}$.

5.4.2 Extreme values of test power sources

5.4.2.1 Mains voltage

The extreme test voltages for equipment to be connected to the ac mains shall be the nominal mains voltage $\pm 10\%$.

5.4.2.2 Battery power source

Where the equipment is designed to operate from a battery, the extreme test voltages shall be 1,3 and 0,9 times the nominal voltage of the battery (12 V, 24 V etc.).

5.4.2.3 Other power sources

For operation from other power sources the extreme test voltages shall be agreed between the testing authority and the equipment manufacturer.

5.5 Procedure for tests at extreme temperatures

The equipment shall be placed in the test chamber at normal temperature. The maximum rate of raising or reducing the temperature of the chamber shall be $1^{\circ}\text{C}/\text{minute}$. The equipment shall be switched off during the temperature stabilizing periods.

[SIST EN 300 698-1 V1.3.1:2003](https://standards.iteh.ai/catalog/standards/sist/3fb6c3f4-aaa2-44d6-821b-d2bdaf/d1a8/sist-ets-300-698-1-v1-3-1-2003)

Before conducting tests at extreme temperatures, the equipment in the test chamber shall have reached thermal equilibrium and be subjected to the extreme temperature for a period of 10 hours to 16 hours.

For tests at the lower extreme temperature, the equipment shall then be switched on to standby or receive condition for one minute, after which the equipment shall meet the requirements of the present document.

For tests at the higher extreme temperature, the equipment shall then be switched on in the high power transmit condition for half an hour, after which the equipment shall meet the requirements of the present document.

The temperature of the chamber shall be maintained at the extreme temperatures for the whole duration of the performance test.

At the end of the test, with the equipment still in the chamber, the chamber shall be brought to normal temperature in not less than 1 hour. The equipment shall then be exposed to normal temperature and relative humidity for not less than 3 hours or until moisture has dispersed, whichever is the longer, before the next test is carried out. Alternatively, observing the same precautions, the equipment may be returned direct to the conditions required for the start of the next test.