



SLOVENSKI STANDARD
SIST EN 300 162-1 V1.3.1:2003
01-december-2003

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FUX]chY`YZ: bg_`]cXXU`b]`_]`b`gdfY`Ya b]`_]`nU`dca cfg_`Ya cV]`bY`glcf]`h Yž_`]`XYi` ^`c
j`dUgcj`]`J<: `È`%`XY. `HM b]` bY_`UfU_`hf]`gh_`Y]`b`a Yf]`bY`a YrcXY

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

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Ta slovenski standard je istoveten z: EN 300 162-1 Version 1.3.1

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 300 162-1 V1.3.1:2003 **en**

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ETSI EN 300 162-1 V1.3.1 (2003-12)

European Standard (Telecommunications series)

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

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Reference

REN/ERM-TG26-061-1

Keywords

EMC, GMDSS, maritime, radio, telephony,
testing, VHF

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Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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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 Radiotelephone transmitters and receivers for the maritime mobile service operating in VHF bands, 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".

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National transposition dates	
Date of adoption of this EN:	5 December 2003
Date of latest announcement of this EN (doa):	31 March 2004
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 September 2004
Date of withdrawal of any conflicting National Standard (dow):	30 September 2004

1 Scope

The present document specifies the minimum requirements for shipborne Very High Frequency (VHF) transmitters and receivers capable of voice and Digital Selective Calling (DSC), fitted with an external antenna connector for use on board ships.

The present document lays down minimum requirements for VHF radio transmitters and receivers operating in certain frequency bands allocated to the maritime mobile service, and incorporates the requirements of the relevant recommendations of the International Maritime Organization (IMO).

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>.

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- [1] Radio Regulations, appendix 18 (2001): "Table of transmitting frequencies in the VHF maritime mobile band".
- [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".
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- [3] ITU-R Recommendation M.493-10 (2000): "Digital selective-calling system for use in the maritime mobile service".
- [4] ITU-R Recommendation M.541-8 (1997): "Operational procedures for the use of digital selective-calling equipment in the maritime mobile service".
- [5] IMO Resolution A.803(19): "Performance Standards for Shipborne VHF Radio Installations capable of Voice Communication and Digital Selective Calling".
- [6] IMO Resolution A.524(13): "Performance Standards for VHF Multiple Watch facilities".
- [7] ITU-T Recommendation O.41 (1994): "Psophometer for use on telephone-type circuits".
- [8] IEC 61162-1 (2000): "Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners".
- [9] ETSI TR 100 028-1 (2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1".
- [10] 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".
- [11] ITU-R Recommendation SM.332-4 (1978): "Selectivity of receivers".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purpose of the present document, the following terms and definitions apply:

Channel 16: frequency of 156,800 MHz

G3E: phase-modulation (frequency modulation with a pre-emphasis of 6 dB/octave) for speech

G2B: phase-modulation with digital information, with a sub-carrier for Digital Selective Calling (DSC) operation

modulation index: ratio between the frequency deviation and the modulation frequency

performance check: check of:

- the transmitter carrier power and frequency; and
- receiver sensitivity (see clause 7.2)

3.2 Symbols

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

dBa	dB relative to 2×10^{-5} Pa
emf	electromotive force
λ	lambda (wavelength)

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3.3 Abbreviations

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

ad	amplitude difference
DSC	Digital Selective Calling
EUT	Equipment Under Test
fd	frequency difference
FSI	Frequency Set Information
RF	Radio Frequency
rms	root mean square
SINAD	Signal + Noise + Distortion/Noise + Distortion
VHF	Very High Frequency

4 General and operational requirements

4.1 Construction

The manufacturer shall declare that compliance to the requirement of clause 4 is achieved and shall provide relevant documentation.

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.

All parts of the equipment to be checked during inspection or maintenance operations shall be readily accessible. The components shall be readily identifiable.

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 there shall be a separation of 4,6 MHz between the transmitting frequency and the receiving frequency (see Radio Regulations [1]).

The equipment, which can consist of more than one unit, 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).

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

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 appendix 18 to the Radio Regulations [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 Digital Selective Calling (DSC) is prevented (see ITU-R Recommendation M.493-10 [3] and ITU-R Recommendation M.541-8 [4]) and that use of channels AIS1 and AIS2 for purposes other than AIS is prevented.

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 appendix 18 to the Radio Regulations [1], of the channel at which the installation is set. The channel designator shall be legible irrespective of the external lighting conditions.

Channels 16 and 70 should be distinctively marked. Selection of channel 16, and if possible channel 70, shall be 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 to 9 is provided, this shall conform to ITU-T Recommendation E.161 [2].

The equipment shall have the following additional controls and indicators (see IMO Resolution A.803(19) [5]):

- 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;
- on/off switch for the loudspeaker;
- a switch for reducing transmitter output power to no more than 1 W;
- an audio frequency power volume control;
- a squelch control;
- a control for reducing the brightness of the equipment illumination to zero;
- a visual indication that the transmitter is activated.

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 a telephone handset or microphone, and an integral loudspeaker and/or a socket for an external loudspeaker. A handset is required if duplex operation is provided.

It shall be possible to switch off the loudspeaker without causing a variation in the audio frequency power provided to the handset, if supplied.

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 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 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 terminals are 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 terminals, there shall be a dc path from the antenna terminals 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.

4.5 Labelling

All controls, instruments, indicators and terminals shall be clearly labelled (see IMO Resolution A.803(19) [5]).

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

All units of 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 shall be stated on the equipment or in the user document supplied with the equipment.

4.6 Warm up

After being switched on the equipment shall be operational within 5 s.

5 Technical requirements

5.1 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.

5.2 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 DSC signalling.

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

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

5.3 Multiple watch facilities

5.3.1 Additional performance standards

VHF radiotelephone equipment having multiple watch facilities shall comply with the following additional performance standards (see IMO Resolution A.524(13) [6]):

- a) the equipment shall include a provision for the automatic scanning of a priority channel and one additional channel. Facilities for the automatic sequential change of the additional channel may be provided, which are not accessible to the user. Means shall be provided to block/unblock;
- b) the priority channel is that channel which will be sampled even if there is a signal on the additional channel and on which the receiver will lock during the time a signal is detected;
- c) the additional channel is that channel which will be monitored during the periods the equipment is not sampling or receiving signals on the priority channel;
- d) provision shall be included to switch the scanning facility on and off by means of a manually operated control. In addition, it shall be ensured that the receiver remains on the same channel as the transmitter for the entire duration of any communication with the ship, e.g. the scanning facility could be switched off automatically when the handset is off its hook;
- e) selection of the additional channel and selection of the priority channel shall be possible at the operating position;
- f) when the scanning facility is in operation, the channel number of both channels on which the equipment is operating shall be clearly indicated simultaneously;
- g) in a transceiver, transmission shall not be possible when the scanning facility is operating. When the scanning facility is switched off, both transmitter and receiver shall be tuned automatically to the selected additional channel;
- h) a transceiver shall be provided with a single manual control (e.g. push-button) in order to switch the equipment quickly for operation on the priority channel;
- j) at the operating position of a transceiver the selected additional channel shall be clearly indicated as being the operational channel of the equipment.