# SLOVENSKI STANDARD
# SIST EN 301 929-1 V1.1.1:2003

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**Elektromagnetna združljivost in zadeve v zvezi z radijskim spektrom (ERM) ï Visokofrekvenļ ni (VHF) oddajniki in sprejemniki kot obalne postaje za globalni pomorski nujnostni in varnostni sistem (GMDSS) in drugo uporabo v mobilni pomorski storitvi ï 1. del: Tehniļ ne karakteristike in merilne metode**

Electromagnetic compatibility and Radio spectrum Matters (ERM); VHF transmitters and receivers as Coast Stations for GMDSS and other applications in the maritime mobile service; Part 1: Technical characteristics and methods of measurement



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*European Standard (Telecommunications series)*

# Electromagnetic compatibility and Radio spectrum Matters (ERM); VHF transmitters and receivers as Coast Stations for GMDSS and other applications in the maritime mobile service; Part 1: Technical characteristics and methods of measurement

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# Contents

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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 VHF transmitters and receivers as Coast Stations for GMDSS and other applications in the maritime mobile service, as identified below:

**Part 1: "Technical characteristics and methods of measurement";**

Part 2: "Harmonized EN under article 3.2 of the R&TTE Directive".



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# 1 Scope

The present document specifies the minimum requirements for transmitters, receivers and transceivers fitted with external antenna connectors, used as coast stations, operating in the VHF band of the maritime mobile service. This includes:

- equipment operating under local or remote control;
- equipment operating on 25 kHz channel spacing;
- equipment capable of analogue speech, Digital Selective Calling (DSC), or both;
- equipment operating in Simplex, Semi-Duplex (Half Duplex) and Duplex modes;
- equipment which may consist of more than one unit;
- equipment which may be single-channel or multi-channel;
- equipment operating on shared radio sites;
- equipment operating in isolation from other radio equipment.

Where the equipment is not intended for DSC operation, only those clauses relevant to non-DSC tests are applicable.

# 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.

[1] ITU Radio Regulations (1998).

[2] ITU-R Recommendation M.489-2: "Technical characteristics of VHF radiotelephone equipment operating in the maritime mobile service in channels spaced by 25 kHz".

[3] ETSI ETR 028 (1994): "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".

[4] ETSI ETR 273: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement of radiated methods of measurement (using test sites) and evaluation of the corresponding measurement uncertainties".

[5] ITU-T Recommendation O.41: "Psophometer for use on telephone-type circuits".

[6] ITU-R Recommendation M.493-10: "Digital selective-calling system for use in the maritime mobile service".

[7] ITU-T Recommendation V.11: "Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s".

# 3 Definitions and abbreviations

## 3.1 Definitions

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

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

## 3.2 Abbreviations

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

| | |
|---|---|
| ac | alternating current |
| ad | amplitude difference |
| dBd | gain relative to a dipole antenna |
| dc | direct current |
| DSC | Digital Selective Calling |
| emf | electromotive force |
| EUT | Equipment Under Test |
| fd | frequency difference |
| Hz | Hertz |
| rms | root mean square |
| SINAD | Signal + Noise + Distortion/Noise + Distortion |
| Tx | transmitter |
| V | Volt |
| VHF | Very High Frequency |



# 4 General and operational requirements

## 4.1 Construction

The mechanical and electrical construction and finish of the equipment shall conform in all respects to good engineering practice.

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, Appendix S18 [1]).

Additional VHF channels outside those defined by the Radio Regulations, Appendix S18 [1] may be provided, but means shall be provided to block any channel including Radio Regulations, Appendix S18 [1] channels. It shall not be possible for the user to unblock or block any channels.

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.

The equipment shall be equipped with a squelch or mute circuit.

## 4.2 Controls and indicators

At the operator position from which the coast station is controlled, the following facilities shall be available:

- if the equipment is intended to be used on channel 16, this channel shall be clearly marked and shall be readily accessible;
- if the equipment is intended to be used on channel 70, there shall be a distinctive indication when this channel is in use;
- a visual indication that the installation is in operation;
- Where more than one radio channel is available, there shall be a visual indication of the radio channel selected for transmission;
- a manual non-locking push-to-talk switch to operate the transmitter (except on equipment designed to operate on channel 70 only);
- a volume control;
- a visual indication that the transmitter is activated;
- the operator shall not have access to any control which, if wrongly set, might impair the technical characteristics of the equipment;
- when there is more than one control unit, indication of the equipment status (e.g. transmit, busy) shall be given to all control units.



## 4.3 Safety precautions

Measures shall be taken to protect the equipment against the effects of excessive current and excessive voltage.



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.

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 min 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 kΩ.

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

## 4.4 Labelling

The voltage of the power supply that the equipment is intended to operate from, 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.

# 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 (ITU-R Recommendation M.489-2 [2]), and G2B for DSC signalling (ITU-R Recommendation M.493-10 [6]).

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

## 5.3 Use of Channel 70

Only Digital Selective Calling (DSC) is permitted on channel 70.

## 5.4 Audio line

The equipment shall have audio line input and output with 600 Ω impedance, symmetrical and free of earth. The audio lines shall operate with voltage levels adjustable within the range 0,775 V rms to 0,775 V rms -20 dB, this is equivalent to 0 dBm to -20 dBm.



## 5.5 DSC Controller Interfaces



If the equipment is designed for connection to an external DSC controller via audio frequency terminals, the input and output impedances shall be 600 Ω free of earth.

If the equipment is designed for connection to an external DSC controller via binary inputs and outputs, the logic level shall comply with ITU-T Recommendation V.11 [7].

The transmitter key input interface shall be a 2-wire circuit closure to transmit with a maximum open circuit voltage of 50 V and a maximum closed circuit current of 100 mA.

# 6 General conditions of measurement

## 6.1 Arrangements for test signals applied to the receiver input

Test signal sources shall be connected to the receiver input in such a way that the impedance presented to the receiver input is 50 Ω non-reactive, irrespective of whether one or more test signals are applied to the receiver simultaneously.

The levels of the test signals shall be expressed in terms of the emf at the terminals to be connected to the receiver.

The nominal frequency of the receiver is the carrier frequency of the selected channel.

## 6.2 Squelch

The squelch or mute circuit shall be switched off for the duration of the conformance tests.

## 6.3 Normal test modulation

For normal test modulation, the modulation frequency shall be 1 kHz and the frequency deviation shall be ±3 kHz.

## 6.4 Artificial antenna

When tests are carried out with an artificial antenna, this shall be a non-reactive, non-radiating 50 Ω load.

## 6.5 Standard test signals for DSC

### 6.5.1 References to standard test signals

Standard test signals consist of a series of identical call sequences, each of which contains a known number of information symbols (format specifier, address, category, identification etc. of ITU-R Recommendation M.493-10 [6], clause 1.5), see also clause 6.6. Standard test signals should be of sufficient length for the measurements to be performed or it should be possible to repeat them without interruption to make the measurements.

### 6.5.2 Standard test signal

The standard test signal for the VHF DSC decoder shall be a phase-modulated signal at VHF channel 70 (or other suitable channel where channel 70 is not available within this equipment) with modulation index = 2. The modulating signal shall have a nominal frequency of 1 700 Hz and a frequency shift of ±400 Hz with a modulation rate of 1 200 Baud. For non-integrated equipment, the standard test signal shall be the modulating signal only.



## 6.6 Determination of the symbol error rate in the output of the receiving part



The information content of the decoded call sequence to which forward error correction, interleaving technique and check-sum information is applied, shall be divided into blocks, each of which, corresponds to one information symbol in the applied test signal (see clause 6.5). The total number of incorrect information symbols relative to the total number of information symbols shall be registered.

## 6.7 DSC Decoder

Where the equipment under test is intended to receive DSC calls using an external DSC controller, the manufacturer shall supply as a part of the test equipment a suitable stand-alone DSC decoder to be used in carrying out the receiver tests dealing with DSC related parameters.

## 6.8 Test channels

For analogue speech, tests shall be made on channel 16 if available, or a channel as close to the centre of the frequency range of the equipment unless otherwise stated. For DSC, tests shall be made on channel 70 unless otherwise stated.