

**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Technical characteristics and methods of measurement
for shipborne watchkeeping receivers
for reception of Digital Selective Calling (DSC)
in the maritime MF, MF/HF and VHF bands**

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Contents

Intellectual Property Rights	7
Foreword.....	7
1 Scope	8
2 References	8
2.1 Normative references	8
2.2 Informative references.....	9
3 Definitions and abbreviations.....	10
3.1 Definitions.....	10
3.2 Abbreviations	10
4 General and operational requirements.....	10
4.1 General	10
4.2 Construction	10
4.2.1 General.....	10
4.2.2 Design.....	11
4.2.3 Accessibility	11
4.2.4 Calibration and maintenance.....	11
4.2.5 Antenna static protection	11
4.2.6 Digital input panels.....	11
4.3 Controls and indicators.....	11
4.3.1 General.....	11
4.3.2 Identification.....	11
4.3.3 Protection against possible maladjustment.....	11
4.3.4 Light sources.....	12
4.3.5 Operation	12
4.4 Software	12
4.5 Memory.....	12
4.6 Interfaces	12
4.6.1 DSC signal output; analogue interface.....	12
4.6.2 DSC signal output; digital interface.....	12
4.6.3 Operational interfaces.....	13
4.7 Marking and identification	13
4.8 Instructions.....	13
4.9 Warming-up period	13
4.10 Safety precautions	14
4.10.1 Excessive current and voltage.....	14
4.10.2 Earthing	14
4.10.3 Protection.....	14
4.11 Compass safe distance.....	14
5 Technical requirements	14
5.1 Frequency bands and channels	14
5.2 Mode of reception	15
5.3 Scanning receivers.....	15
5.3.1 Scanning sequence.....	15
5.3.2 Scanning frequencies	15
5.3.2.1 DSC distress frequencies.....	15
5.3.2.2 DSC frequencies for general communication.....	15
5.3.3 Stop/start of scanning.....	15
5.3.4 Frequency information.....	16
6 General test conditions	16
6.1 General	16
6.2 Test power source.....	16
6.3 Normal test conditions.....	16
6.3.1 Normal temperature and humidity.....	16

6.3.2	Normal test power source	16
6.3.2.1	ac voltage and frequency	16
6.3.2.2	Secondary battery power sources	17
6.3.2.3	Other power sources	17
6.4	Extreme test conditions	17
6.4.1	Extreme temperature tests	17
6.4.2	Extreme values of test power source	17
6.4.2.1	a.c. voltage and frequency	17
6.4.2.2	Secondary battery power sources	17
6.4.2.3	Other power sources	17
6.5	Connection of test signals to the receiver	17
6.5.1	Sources	17
6.5.2	Levels	18
6.6	Testing frequencies	18
6.6.1	General test frequencies	18
6.6.2	Additional test frequencies for HF equipment	18
6.7	Test signals	18
6.7.1	Standard test signal No. 1	18
6.7.2	Standard test signal No. 2	18
6.8	Measurement of bit error ratio	18
6.9	Measurement uncertainty and interpretation of the measuring results	19
6.9.1	Measurement uncertainty	19
6.9.2	Interpretation of measurement results	19
7	Environmental tests	19
7.1	Procedure	19
7.2	Performance check	20
7.3	Vibration test	20
7.3.1	Definition	20
7.3.2	Method of measurement	20
7.3.3	Requirement	20
7.4	Temperature tests	20
7.4.1	Dry heat	21
7.4.1.1	Definition	21
7.4.1.2	Method of measurement	21
7.4.1.3	Requirement	21
7.4.2	Damp heat	21
7.4.2.1	Definition	21
7.4.2.2	Method of measurement	21
7.4.2.3	Requirement	21
7.4.3	Low temperature	21
7.4.3.1	Definition	21
7.4.3.2	Method of measurement	22
7.4.3.3	Requirement	22
7.5	Corrosion test	22
7.5.1	General	22
7.5.2	Definition	22
7.5.3	Method of measurement	22
7.5.4	Requirements	22
8	MF/HF watchkeeping receiver	23
8.1	Calling sensitivity	23
8.1.1	Definition	23
8.1.2	Method of measurement	23
8.1.3	Limits	23
8.2	Adjacent channel selectivity	23
8.2.1	Definition	23
8.2.2	Method of measurement	23
8.2.3	Limits	24
8.3	Co-channel rejection	24
8.3.1	Definition	24
8.3.2	Method of measurements	24

8.3.3	Limits.....	24
8.4	RF intermodulation response.....	24
8.4.1	Definition.....	24
8.4.2	Method of measurement	24
8.4.3	Limits.....	24
8.5	Spurious response rejection.....	25
8.5.1	Definition.....	25
8.5.2	Method of measurement	25
8.5.3	Limits.....	26
8.6	Dynamic range	26
8.6.1	Definition.....	26
8.6.2	Method of measurement	26
8.6.3	Limits.....	26
8.7	Conducted spurious emissions into the antenna.....	26
8.7.1	Definition.....	26
8.7.2	Method of measurement	26
8.7.3	Limits.....	27
8.8	Radiated spurious emissions.....	27
8.8.1	Definition.....	27
8.8.2	Method of measurements.....	27
8.8.3	Limit	28
8.9	Protection of receiver antenna input circuits	28
8.9.1	Definition.....	28
8.9.2	Method of measurement	28
8.9.3	Limits.....	28
8.10	Scanning efficiency	28
8.10.1	Definition.....	28
8.10.2	Method of measurement	28
8.10.3	Limits.....	28
8.11	Stop/start of scanning (Watchkeeping receiver without DSC decoder)	29
8.11.1	Definition.....	29
8.11.2	Method of measurement	29
8.11.3	Limits.....	29
9	VHF watchkeeping receiver.....	29
9.1	Calling sensitivity.....	29
9.1.1	Definition.....	29
9.1.2	Method of measurement	29
9.1.3	Limits.....	29
9.2	Adjacent channel selectivity.....	29
9.2.1	Definition.....	29
9.2.2	Method of measurement	30
9.2.3	Limits.....	30
9.3	Co-channel rejection.....	30
9.3.1	Definition.....	30
9.3.2	Method of measurement	30
9.3.3	Limits.....	30
9.4	Intermodulation response	30
9.4.1	Definition.....	30
9.4.2	Method of measurement	31
9.4.3	Limits.....	31
9.5	Spurious response and blocking immunity.....	31
9.5.1	Definition.....	31
9.5.2	Method of measurement	31
9.5.3	Limits.....	31
9.6	Dynamic range	31
9.6.1	Definition.....	31
9.6.2	Method of measurement	32
9.6.3	Limit	32
9.7	Conducted spurious emissions into the antenna.....	32
9.7.1	Definition.....	32
9.7.2	Method of measurement	32

9.7.3	Limit	32
9.8	Radiated spurious emissions.....	32
9.8.1	Definition.....	32
9.8.2	Method of measurements.....	32
9.8.3	Limit	33
Annex A (normative): Radiated measurements		34
A.1	Test sites and general arrangements for measurements involving the use of radiated fields	34
A.1.1	Outdoor test site	34
A.1.2	Test antenna.....	35
A.1.3	Substitution antenna	35
A.1.4	Optional additional indoor site	35
A.2	Guidance on the use of radiation test sites	36
A.2.1	Measuring distance.....	36
A.2.2	Test antenna.....	36
A.2.3	Substitution antenna	36
A.2.4	Artificial antenna	37
A.2.5	Auxiliary cables.....	37
A.2.6	Acoustic measuring arrangement	37
A.3	Further optional alternative indoor test site using an anechoic chamber	37
A.3.1	Example of the construction of a shielded anechoic chamber	38
A.3.2	Influence of parasitic reflections in anechoic chambers.....	38
A.3.3	Calibration of the shielded anechoic chamber.....	39
Annex B (informative): Bibliography.....		41
History		42

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the ETSI standards One-step Approval Procedure.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

1 Scope

The present document states the minimum operational and performance requirements for shipborne receivers intended to be connected to an external installation, including a decoder for DSC, and used as receivers for watchkeeping DSC on board ships operating in the mobile MF, MF/HF and VHF band allocated in the ITU Radio Regulations [1] to the maritime mobile service, both in connection with distress and safety communication and in connection with general communication.

These requirements include the relevant provisions of the ITU Radio Regulations [1], ITU-R Recommendations M.493-12 [3], M.541-9 [10], M.489-2 [9] and the IMO Resolutions A.803(19), A.804(19), A.806(19) and A.694(17).

The present document specifies also technical characteristics, methods of testing and required test results for dedicated watchkeeping receivers for use with radio installations in the GMDSS as required by chapter IV of the SOLAS.

It covers both receivers with analogue output or with digital DSC signal output interfaces or with both.

DSC watchkeeping receivers may be a separate equipment or be integrated with a DSC or radiotelephone equipment.

For integrated equipment the present document specifies the requirements and methods of testing of the DSC watchkeeping receivers only.

DSC watchkeeping receivers can be either fixed-frequency receivers or, in MF/HF bands, scanning receivers.

Requirements for the DSC equipment or radiotelephone equipment are given in EN 300 338-2 [12], EN 301 925 [11] and EN 300 373-1 [13] respectively.

2 References

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.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
 - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
 - for informative references.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- [1] ITU Radio Regulations (2008).
- [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] ITU-R Recommendation M.493-12 (2007): "Digital selective-calling system for use in the maritime mobile service".

- [4] ISO 3791 (1976): "Office machines and data processing equipment -- Keyboard layouts for numeric applications".
- [5] IEC 61162-1 (2007): "Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners".
- [6] Void.
- [7] ITU-T Recommendation V.11 (1996): "Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s".
- [8] IEC 60417: "Graphical symbols for use on equipment".
- [9] ITU-R Recommendation M.489-2: "Technical characteristics of VHF radiotelephone equipment operating in the maritime mobile service in channels spaced by 25 kHz".
- [10] ITU-R Recommendation M.541-9 (2004): "Operational procedures for the use of digital selective-calling equipment in the maritime mobile service".
- [11] ETSI EN 301 925: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Radiotelephone transmitters and receivers for the maritime mobile service operating in VHF bands; Technical characteristics and methods of measurement".
- [12] ETSI EN 300 338-2: "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; Part 2: Class A/B DSC".
- [13] ETSI EN 300 373-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Maritime mobile transmitters and receivers for use in the MF and HF bands; Part 1: Technical characteristics and methods of measurement".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

- [i.1] Void.
- [i.2] ITU-R Recommendation SM.332-4 (1978): "Selectivity of receivers".
- [i.3] Void.
- [i.4] Void.
- [i.5] ETSI TR 100 028-1 (2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1".

3 Definitions and abbreviations

3.1 Definitions

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

assigned frequency: centre of the frequency band assigned to a station

continuous watch: continuous watch means that the radio watch concerned is not interrupted other than for brief intervals when the ship's receiving capability is impaired or blocked by its own communications or when the facilities are under periodical maintenance or check

F1B: frequency modulation with digital information, without a sub-carrier for automatic reception

G2B: phase-modulation with digital information, with a sub-carrier for automatic reception

J2B: single sideband with digital information, with the use of a modulating sub-carrier for automatic reception, with the carrier suppressed to at least 40 dB below peak envelope power

performance check: check of calling sensitivity (see clause 7.2)

3.2 Abbreviations

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

a.c.	alternating current
d.c.	direct current
DSC	Digital Selective Calling
e.m.f.	electromotive force
EUT	Equipment Under Test
FSK	Frequency Shift Keying
GMDSS	Global Maritime Distress and Safety System
HF	High Frequency
IF	Intermediate Frequency
IMO	International Maritime Organization
MF	Medium Frequency
MF/HF	Medium and High Frequency
r.m.s.	root mean square
RF	Radio Frequency
SOLAS	(International Convention for the) Safety of Life at Sea
VHF	Very High Frequency

4 General and operational requirements

4.1 General

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

4.2 Construction

4.2.1 General

The equipment shall be so constructed that it is capable of keeping continuous watch on relevant DSC channels (see clause 5.1) and of being operated readily.

4.2.2 Design

In all respects the mechanical and electrical design and construction and the finish of the equipment shall conform with good engineering practice, and the equipment shall be suitable for use on board ships at sea.

The equipment shall be designed for continuous operation.

4.2.3 Accessibility

All parts of the equipment that are subject to inspection and maintenance adjustments, shall be easily accessible. Components shall be easily identifiable either by markings within the equipment, or with the aid of technical descriptions.

4.2.4 Calibration and maintenance

The equipment shall be so constructed that its main modules can easily be replaced and put into operation without elaborate recalibration or readjustment.

4.2.5 Antenna static protection

In order to protect against damage due to static voltages that may appear at the input of the receiver, there shall be a d.c. path from the antenna terminal to ground not exceeding 100 k Ω .

4.2.6 Digital input panels

Where a digital input panel with the digits "0" to "9" is provided, the digits should be arranged to conform with ITU-T Recommendation E.161 [2]. However, where an alphanumeric keyboard layout, as used on office machinery and data processing equipment, is provided, the digits "0" to "9" may, alternatively, be arranged to conform with ISO 3791 [4].

4.3 Controls and indicators

4.3.1 General

The number of operational controls, their design and manner of functioning, location, arrangement and size should provide for simple, quick and efficient operation. All operational controls shall permit normal adjustments to be easily performed and shall be arranged in a manner which minimizes the risk of inadvertent activation.

4.3.2 Identification

All operational controls and indicators shall be easy to identify and read from the position at which the equipment is normally operated.

The controls and indicators shall be identified in English. Symbols as specified in IEC 60417 [8] may be used in addition.

4.3.3 Protection against possible maladjustment

Controls not required for normal operation shall not be readily accessible.

Operational controls, the inadvertent exercise of which could switch off the equipment, lead to its performance degradation or to false indications not obvious to the operator, shall be protected especially against unintentional operation.

4.3.4 Light sources

Equipment with controls and indicators shall be provided with adequate adjustable illumination to enable identification of controls and facilitate reading of indicators at all times. Means shall be provided for dimming the output of any equipment light source.

4.3.5 Operation

The equipment shall be so designed that misuse of the controls cannot cause injury to personnel.

4.4 Software

Facilities shall be provided to protect all operational software incorporated in the equipment.

Any software required in an equipment to facilitate operation, including that for its initial activation/reactivation, shall be permanently installed within the equipment, in such a way that it is not possible for the user to have access to this software.

Means shall be provided to monitor the operation of the equipment at appropriate regular intervals and to activate an alarm or signal in the event of a failure which is not recoverable automatically.

4.5 Memory

Pre-programmed DSC distress calling frequencies and information inherent to the operation of the equipment shall be stored in non-volatile devices.

If the equipment contains information in operator programmable memory devices, such devices shall be protected from interruptions in the power supply up to at least 10 hours duration.

4.6 Interfaces

The equipment submitted for test, when integrated with a DSC or radiotelephone equipment, shall be provided with an accessible test point at the watchkeeping receiver analog or digital signal output.

4.6.1 DSC signal output; analogue interface

For equipment designed for analogue DSC signal output to an external DSC decoder, the audio frequency signal output shall have an impedance of 600 Ω , balanced and free of earth and the closed circuit level shall be adjustable to any r.m.s. voltage between 0,245 V and 2,450 V (0 dBm \pm 10 dB).

The audio frequency subcarrier shall be 1 700 Hz and the sideband shall be preserved.

The higher frequency corresponds to the B-state and the lower frequency corresponds to the Y-state of the signal elements.

4.6.2 DSC signal output; digital interface

For equipment designed for binary signal output to an external DSC decoder, the logic level of the digital signal output shall be compatible with ITU-T Recommendation V.11 [7].

The B-state shall be the logic "0", and the Y-state shall be the logic "1".