

Draft ETSI EN 301 925 V1.5.0 (2016-12)



Radiotelephone transmitters and receivers for the maritime mobile service operating in VHF bands; Technical characteristics and methods of measurement

iTeh STANDARDS REVIEW
(Standards.iteh.ai)
Full standard
<https://standards.iteh.ai/catalog/standards/etsi-en-301-925-v1.5.0-2016-12-10>
4f5a-a273-ea066aec691/etsi-en-301-925-v1.5.0-2016-12-10

Reference

REN/ERM-TG26-531

Keywords

EMC, GMDSS, maritime, radio, telephony, VHF

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - 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

iTeh STANDARD
(Standards.iteh.org)
Full standard:
<http://www.etsi.org/standards/sistecatalog/standards/sistecatalog/standards/etsi-en-301-925-v1.5.1-2017-10>

Important notice

The present document can be downloaded from:
<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2016.
All rights reserved.

DECT™, PLUGTESTS™, UMTS™ and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.
3GPP™ and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and
of the 3GPP Organizational Partners.

GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights	8
Foreword.....	8
Modal verbs terminology.....	8
1 Scope	9
2 References	9
2.1 Normative references	9
2.2 Informative references.....	10
3 Definitions, symbols and abbreviations	11
3.1 Definitions.....	11
3.2 Symbols.....	12
3.3 Abbreviations	12
4 General requirements	13
4.1 Construction	13
4.2 DSC operation.....	14
4.3 Controls and indicators.....	14
4.4 Handset and loudspeaker.....	15
4.5 Safety precautions	15
4.6 Labelling.....	15
4.7 Warm up.....	15
4.8 Audio Processing.....	16
5 Technical requirements	16
5.1 Switching time.....	16
5.2 Class of emission and modulation characteristics.....	16
5.3 Multiple watch facilities.....	16
5.3.1 Additional performance standards.....	16
5.3.2 Scanning characteristics.....	17
5.4 Interfaces	17
5.4.0 General.....	17
5.4.1 Audio frequency	17
5.4.2 Digital interfaces.....	18
5.5 Voyage data recorder interface.....	18
6 Test conditions, power sources and ambient temperatures	18
6.1 Test conditions	18
6.2 Test power source.....	18
6.3 Normal test conditions.....	18
6.3.1 Normal temperature and humidity	18
6.3.2 Normal power source voltage	19
6.3.2.1 Mains powered equipment	19
6.3.2.2 Battery powered equipment	19
6.3.2.3 Other power sources.....	19
6.4 Extreme test conditions	19
6.4.1 Extreme temperatures	19
6.4.2 Extreme values of power source voltage	19
6.4.2.1 Mains powered equipment	19
6.4.2.2 Battery powered equipment	19
6.4.2.3 Other power sources.....	19
6.5 Procedure for tests at extreme temperatures.....	19
7 General conditions of measurement	20
7.1 Sequence of testing.....	20
7.2 Test channels	20
7.3 Squelch.....	20
7.4 Arrangements for test signals applied to the receiver input.....	20

7.5	Normal test modulation of the receiver wanted signal	20
7.6	Arrangements for monitoring the receiver output	21
7.7	Arrangements for test signals applied to the transmitter input	21
7.8	Normal test modulation of the transmitter	21
7.9	Arrangements for monitoring the transmitter output	21
7.10	Arrangements for test of DSC	21
7.11	Standard test signals for DSC	21
7.12	Determination of symbol error ratio in the output of the receiver	22
7.13	Reference bandwidths for spurious measurements	22
7.14	Interpretation of the measurement results	22
8	Performance checks	23
8.1	Performance checks - introduction	23
8.2	Performance check - transmitter frequency error	23
8.3	Performance check - transmitter carrier power	23
8.4	Performance check - transmitter audio frequency harmonic distortion of the emission	23
8.5	Performance check - receiver sensitivity	24
8.6	Performance check of DSC	24
9	Environmental tests	24
9.1	Procedure	24
9.2	Vibration test	24
9.2.1	Definition	24
9.2.2	Method of measurement	24
9.2.3	Requirement	25
9.3	Temperature tests	25
9.3.1	Introduction	25
9.3.2	General procedure	25
9.3.3	Dry heat	25
9.3.3.1	Definition	25
9.3.3.2	Method of measurement	25
9.3.3.3	Requirement	26
9.3.4	Damp heat	26
9.3.4.1	Definition	26
9.3.4.2	Method of measurement	26
9.3.4.3	Requirement	26
9.3.5	Low temperature cycle	26
9.3.5.1	Definition	26
9.3.5.2	Method of measurement	26
9.3.5.3	Requirement	26
10	Transmitter	27
10.1	General conditions	27
10.2	Frequency error	27
10.2.1	Definition	27
10.2.2	Method of measurement	27
10.2.3	Limits	27
10.3	Carrier power	27
10.3.1	Definitions	27
10.3.2	Method of measurement	27
10.3.3	Limits	27
10.3.3.1	General	27
10.3.3.2	Normal test conditions limits	28
10.3.3.3	Extreme test conditions limits	28
10.4	Frequency deviation	28
10.4.1	Definition	28
10.4.2	Maximum permissible frequency deviation	28
10.4.2.1	Method of measurement	28
10.4.2.2	Limits	28
10.4.3	Reduction of frequency deviation at modulation frequencies above 3 kHz	28
10.4.3.1	Method of measurement	28
10.4.3.2	Limits	29
10.5	Sensitivity of the modulator including the microphone	29

Draft STANDARD PREVIEW
 https://standards.etsi.org/catalog/full-standard/
 45a/223-ca06aec691/etsi-en-301-925-v1.5.0-2017-10

10.5.1	Definition.....	29
10.5.2	Method of measurement	30
10.5.3	Limits.....	30
10.6	Audio frequency response	30
10.6.1	Definition.....	30
10.6.2	Method of measurement	30
10.6.3	Limits.....	30
10.7	Audio frequency harmonic distortion of the emission.....	31
10.7.1	Definition.....	31
10.7.2	Method of measurement	31
10.7.3	Limits.....	31
10.8	Adjacent channel power	32
10.8.1	Definition.....	32
10.8.2	Method of measurement	32
10.8.3	Limits.....	32
10.9	Conducted spurious emissions conveyed to the antenna	32
10.9.1	Definition.....	32
10.9.2	Method of measurement	32
10.9.3	Limit	33
10.10	Residual modulation of the transmitter	33
10.10.1	Definition.....	33
10.10.2	Method of measurement	33
10.10.3	Limit	33
10.11	Transient frequency behaviour of the transmitter	33
10.11.1	Definition.....	33
10.11.2	Method of measurement	33
10.11.3	Limits.....	34
10.12	Radiated spurious emission	36
10.12.1	Definition.....	36
10.12.2	Method of measurement	36
10.12.3	Limits.....	37
11	Transmitter with integrated DSC encoder	37
11.0	General	37
11.1	Frequency error (carrier)	37
11.1.1	Definition.....	37
11.1.2	Method of measurement	37
11.1.3	Limits.....	37
11.2	Frequency error (demodulated signal)	38
11.2.1	Definition.....	38
11.2.2	Method of measurement	38
11.2.3	Limits.....	38
11.3	Carrier Power	38
11.3.1	Definition.....	38
11.3.2	Method of measurement	38
11.3.3	Limits.....	38
11.3.3.1	Normal test conditions	38
11.3.3.2	Extreme test conditions	38
11.4	Modulation index	39
11.4.1	Definition.....	39
11.4.2	Method of measurement	39
11.4.3	Limits.....	39
11.5	Modulation rate	39
11.5.1	Definition.....	39
11.5.2	Method of measurement	39
11.5.3	Limits.....	39
11.6	Residual modulation	39
11.6.1	Definition.....	39
11.6.2	Method of measurement	39
11.6.3	Limits.....	39
11.7	Modulator attack time	40
11.7.1	Definition.....	40

11.7.2	Method of measurement	40
11.7.3	Limit	40
11.8	Adjacent channel power	40
11.8.1	Definition.....	40
11.8.2	Method of measurement	40
11.8.3	Limits.....	41
11.9	Conducted spurious emissions	41
11.10	Testing of free channel transmission on DSC channel 70	41
11.10.1	Definition.....	41
11.10.2	Method of measurement	41
11.10.3	Requirement.....	41
11.11	Generated DSC call sequences.....	42
12	Receiver.....	42
12.1	Harmonic distortion and rated audio output power	42
12.1.1	Definition.....	42
12.1.2	Methods of measurement.....	42
12.1.3	Limits.....	42
12.2	Audio frequency response	42
12.2.1	Definition.....	42
12.2.2	Method of measurement	43
12.2.3	Limits.....	43
12.3	Maximum usable sensitivity	44
12.3.1	Definition.....	44
12.3.2	Method of measurement	44
12.3.3	Limits.....	44
12.4	Amplitude characteristic of the receiver	44
12.4.1	Definition.....	44
12.4.2	Method of measurement	44
12.4.3	Limits.....	44
12.5	Co-channel rejection	45
12.5.1	Definition.....	45
12.5.2	Method of measurement	45
12.5.3	Limit	45
12.6	Adjacent channel selectivity	45
12.6.1	Definition.....	45
12.6.2	Method of measurement	45
12.6.3	Limits.....	46
12.7	Spurious response rejection	46
12.7.1	Definition.....	46
12.7.2	Method of measurement	46
12.7.2.1	Introduction to the method of measurement	46
12.7.2.2	Method of search over the "limited frequency range"	47
12.7.2.3	Method of measurement	47
12.7.3	Limit	47
12.8	Intermodulation response	47
12.8.1	Definition.....	47
12.8.2	Method of measurement	48
12.8.3	Limit	48
12.9	Blocking or desensitization	48
12.9.1	Definition.....	48
12.9.2	Method of measurement	48
12.9.3	Limit	48
12.10	Conducted spurious emissions	49
12.10.1	Definition.....	49
12.10.2	Method of measurement	49
12.10.3	Limit	49
12.11	Receiver noise and hum level	49
12.11.1	Definition.....	49
12.11.2	Method of measurement	49
12.11.3	Limit	49
12.12	Squelch operation	49

Draft STANDARD REVIEW
 https://standards.etsi.org/Full standard/
 45a-273-ea066acfa91/etsi-en-301-925-v1.5.1-2017-10
 (Standards.etsi.org)

12.12.1	Description.....	49
12.12.2	Squelch audio muting	50
12.12.2.1	Definition	50
12.12.2.2	Method of measurement.....	50
12.12.2.3	Limits	50
12.12.3	Squelch operating level.....	50
12.12.3.1	Definition	50
12.12.3.2	Method of measurement.....	50
12.12.3.3	Limits	50
12.12.4	Squelch hysteresis.....	50
12.12.4.1	Definition	50
12.12.4.2	Method of measurement.....	50
12.12.4.3	Limit.....	51
12.13	Multiple watch characteristics.....	51
12.13.1	Definitions	51
12.13.2	Method of measurement.....	51
12.13.3	Limits.....	51
12.14	Radiated spurious emission.....	52
12.14.1	Definition.....	52
12.14.2	Method of measurement	52
12.14.3	Limits.....	53
13	Receiver with integrated DSC decoder	53
14	Duplex operation.....	53
14.1	Introduction	53
14.2	Receiver desensitization with simultaneous transmission and reception.....	53
14.2.1	Definition.....	53
14.2.2	Method of measurement	54
14.2.3	Limits	54
14.3	Duplex transceiver internal mixing	54
14.3.1	Definition.....	54
14.3.2	Method of measurement	54
14.3.3	Limits.....	55
Annex A (normative):	Measuring receiver for adjacent channel power measurement.....	56
A.1	General description of power measuring receiver.....	56
A.2	IF filter.....	56
A.3	Attenuation indicator.....	57
A.4	RMS value indicator.....	57
A.5	Oscillator and amplifier.....	57
Annex B (normative):	Protocol for the IEC EN 61162-1 commands Frequency Set Information (FSI).....	58
B.1	Frequency Set Information (FSI)	58
Annex C (informative):	DSC test calls.....	59
C.1	Interoperability tests	59
History	60	

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 ETSI SR 000 314: "Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

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 ETSI 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 draft European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

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):	18 months after doa

*Full standard:
<https://standards.etsi.ai/catalog/standard/6ca691/etsi-en-301-925-v1.5.1-2017-10>*

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are NOT allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document specifies the minimum requirements for shipborne radio transmitters and receivers for fixed installations operating in the VHF frequency bands between 156 MHz and 174 MHz allocated to the maritime mobile service, using both 25 kHz and 12,5 kHz channels and capable of Radiotelephony and Digital Selective Calling communications within the Global Maritime Distress and Safety System. The present document incorporates the requirements of the relevant resolutions of the International Maritime Organization (IMO) and is primarily intended to specify equipment suitable for fitting to ships subject to the SOLAS Convention [i.2] and complying with the Council Directive 2014/90/EU [i.3] of 23 July2014 on marine equipment (the European Marine Equipment Directive).

The present document does not address the testing of ancillary equipment on a stand-alone basis, i.e. separately from the radio equipment with which it is to be used.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://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.

The following referenced documents are necessary for the application of the present document.

- [1] Void.
- [2] Void.
- [3] IMO Resolution A.803(19) (as amended by MSC.68(68)): "Performance Standards for Shipborne VHF Radio Installations capable of Voice Communications and Digital Selective Calling".
- [4] ITU Radio Regulations (2016).
- [5] Recommendation ITU-R M.493-14 (2015): "Digital selective-calling system for use in the maritime mobile service".
- [6] Recommendation ITU-R M.541-10 (2015): "Operational procedures for the use of digital selective-calling equipment in the maritime mobile service".
- [7] Recommendation ITU-T O.41 (1994): "Psophometer for use on telephone-type circuits".
- [8] Void.
- [9] ETSI EN 300 338-2 (V1.4.0): "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".
- [10] IEC 61162-1 (2016): "Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners".
- [11] Void.
- [12] ETSI TS 103 052 (V1.1.1) (03-2011): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Radiated measurement methods and general arrangements for test sites up to 100 GHz".
- [13] Void.

- [14] Recommendation ITU-R M.1084-5 (2012): "Interim solutions for improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service".
- [15] Void.
- [16] IEC 61000-4-11 (Ed.2.0) (2004): "Electromagnetic compatibility (EMC) - Part 4-11: Testing and measuring techniques - Voltage dips, short interruptions and voltage variations immunity tests".
- [17] ETSI EN 301 033 (V1.4.1) (2013): "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".
- [18] Recommendation ITU-R M.489-2 (1995): "Technical characteristics of VHF radiotelephone equipment operating in the maritime mobile service in channels spaced by 25 kHz".
- [19] Recommendation ITU-R SM.329-12 (2012): "Unwanted emissions in the spurious domain".
- [20] Void.
- [21] Recommendation ITU-T 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".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] IMO Resolution A.524(13): "Performance Standards for VHF Multiple Watch Facilities".
- [i.2] IMO SOLAS 1974: "International Convention for the Safety of Life at Sea" as amended.
- [i.3] Council Directive 2014/90/EU of 23 July 2014 on marine equipment.
- [i.4] ETSI TR 100 028-1 (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1".
- [i.5] ETSI TS 101 570-2 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Interoperability Testing for Maritime Digital Selective Calling (DSC) Radios; Part 2: Class A/B Test Descriptions".
- [i.6] CENELEC EN 60945 (2002): "Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results".
- [i.7] ETSI TR 100 028-2 (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2".
- [i.8] ETSI EN 301 843-2: "ElectroMagnetic Compatibility (EMC) standard for marine radio equipment and services; Harmonised Standard covering the essential requirements of article 3.1b of the Directive 2014/53/EU; Part 2: Specific conditions for VHF radiotelephone transmitters and receivers".
- [i.9] Recommendation ITU-R SM.332-4 (1978): "Selectivity of receivers".
- [i.10] Recommendation ITU-R M.689-2 (1994): "International maritime VHF radiotelephone system with automatic facilities based on DSC signalling format".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

ancillary equipment: equipment (apparatus) used in connection with a transmitter or receiver is considered to be an ancillary equipment if:

- the equipment is intended for use in conjunction with a transmitter or receiver to provide additional operational 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 standalone basis to provide user functions independently of the radio equipment; and
- the radio equipment to which it is connected is capable of providing some intended operation, such as transmitting or receiving, without the ancillary equipment (i.e. it is not a sub-unit of the radio equipment essential to the basic functions of the radio equipment).

continuous phenomena (continuous disturbance): electromagnetic disturbance, the effects of which on a particular device or equipment cannot be resolved into a succession of distinct effects

duplex operation: operating method in which transmission is possible simultaneously in both directions of a telecommunications channel

effective radiated power: product of the power supplied to the antenna and its gain relative to a half-wave dipole (see ITU Radio Regulations [4])

enclosure port: physical boundary of the apparatus through which electromagnetic fields may radiate or impinge

NOTE: In the case of integral antenna equipment, this port is inseparable from the antenna port.

G2B: phase-modulation (frequency modulation with a pre-emphasis of 6 dB/octave) for Digital Selective Calling (DSC) operation

NOTE: The carrier is modulated by a sub-carrier which is FSK modulated by digital data.

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

integral antenna: 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

NOTE: An integral antenna may be fitted internally or externally to the equipment.

mobile equipment: marine receiver, transmitter or transmitter/receiver (transceiver) intended for installation and use onboard ships, and powered by the ship's supply

modulation index: ratio between the frequency deviation and the frequency of the modulating audio signal

operating frequency range: range(s) of continuous radio frequencies covered by the Equipment Under Test without any change of units

performance check: check of the transmitter frequency error, carrier power, audio frequency harmonic distortion of emission; and receiver sensitivity

port: particular interface of the specified equipment (apparatus), with the electromagnetic environment

EXAMPLE: Any connection point on an equipment intended for connection of cables to or from that equipment is considered as a port (see Figure 1).

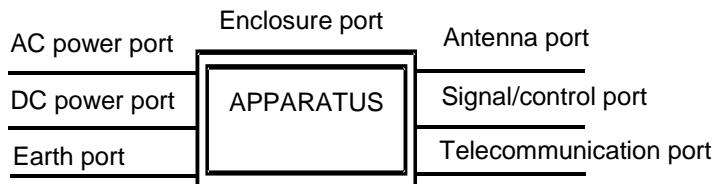


Figure 1: EUT Ports for EMC purposes

Q ratio: ratio of an observed magnitude of acceleration at the equipment to the magnitude of acceleration at the base of the vibration table

radio communications equipment: marine communications equipment which includes one or more radio transmitters or receivers or parts thereof, for use in a mobile application onboard ship

NOTE: Such equipment may be operated with ancillary equipment but, if so, is not dependent upon it for basic functionality.

semi-duplex operation: operating method in which simplex operation is used at one end of the circuit and duplex operation at the other

simplex: operating method in which transmission is made possible alternately in each direction of a telecommunications channel, for example, by means of manual control

spurious emission: emission on a frequency, or frequencies, which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information

NOTE: Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out-of-band emissions (see ITU Radio Regulations [4]).

switching range: maximum frequency range over which the receiver or the transmitter can be operated without reprogramming or realignment

transient phenomena: pertaining to or designating a phenomena or a quantity which varies between two consecutive steady states during a time interval short compared with the time-scale of interest

3.2 Symbols

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

dBA	sound pressure relative to 2×10^{-5} Pa
dBd	antenna gain relative to a half-wave dipole
f _{IF}	Intermediate Frequency
f _{lo}	frequency of the local oscillator signal
λ	lambda (wavelength)
Q	mechanical resonance

3.3 Abbreviations

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

AC	Alternating Current
ad	amplitude difference
AIS	Automatic Identification System
ARQ	Automatic Response reQuest
DC	Direct Current
DSC	Digital Selective Calling
EMC	ElectroMagnetic Compatibility
emf	electromotive force
EUT	Equipment Under Test
FEC	Forward Error Correction

fd	frequency difference
FM	Frequency Modulation
FSI	Frequency Set Information
GMDSS	Global Maritime Distress and Safety System
IF	Intermediate Frequency
IMO	International Maritime Organization
MF/HF	Medium Frequency/High Frequency
MPFD	Maximum Permitted Frequency Deviation
MUS	Maximum Usable Sensitivity
NBDP	Narrow Band Direct Printing
OATS	Open Area Test Site
pd	potential difference
PSTN	Public Switched Telephone Network
RBW	Resolution Bandwidth
RF	Radio Frequency
rms	root mean square
SER	Symbol Error Rate
SINAD	Signal + Noise + Distortion/Noise + Distortion
sr	switching range
VDR	Voyage Data Recorder
VHF	Very High Frequency

4 General requirements

4.1 Construction

The manufacturer shall declare compliance to the requirements of this clause (clause 4) 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 equipment, which may consist of more than one unit, shall be capable of operating on single frequency (simplex) and two-frequency (semi-duplex) channels with manual control. When operating on two-frequency channels there shall be a separation of 4,6 MHz between the transmitting frequency and the receiving frequency (see Radio Regulations Appendix 18 [4]). The equipment may also be capable of operating on two-frequency channels without manual control (duplex).

The equipment shall be able to operate on appropriate channels as defined in Appendix 18 to the Radio Regulations [4], noting in particular footnotes m) and e).

Additional VHF channels outside those defined by Appendix 18 to the Radio Regulations [4] may also be provided.

If 12,5 kHz channels are implemented in the equipment it shall be in accordance with Recommendation ITU-R M.1084-5 [14].

Additional VHF channels for maritime use outside those defined by Appendix 18 to the Radio Regulations [4] may also be provided where permitted by relevant administrations. These channels shall be clearly identified for use as relating to the relevant administration(s) and accessed through a positive action(s) for enabling use of these channel(s) but means shall be provided to block any or all of these additional channels if required by the relevant administration(s).