

Australian/New Zealand Standard™

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

Part 2: Major coast stations, limited coast stations, ship stations and handheld stations (non DSC) (ETS 300 162:1998, MOD)

[ETS title: 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]



AS/NZS 4415.2:2003

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Originated as part of AS/NZS 4415:1996.
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PREFACE

This Standard was prepared by the Joint Australian/New Zealand Standards Committee RC-004, Radiocommunications Equipment—Maritime and Safety of Life, as one of a series of Standards intended to provide specifications for spectrum management and minimum radio equipment performance. It supersedes AS/NZS 4415:1996 in part.

This Standard incorporates Amendment No. 1 (June 2004). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

The objective of this Standard is to provide manufacturers, suppliers, testing facilities and operators with the minimum requirements for performance, technical characteristics and methods of testing for VHF maritime transmitters and receivers, to facilitate design and confirmation of compliance with Australian and New Zealand radiofrequency spectrum and maritime regulatory requirements.

This Standard is reproduced from ETS 300 162:1998, *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*, drawn up by the Radio Equipment and Systems (RES) Technical Committee of the European Telecommunications Standards Institute.

This Standard differs from ETS 300 162:1998 in that some requirements are varied to reflect local conditions and usage. The scope of the Standard includes coast stations and handheld stations in addition to ship stations.

Variations to ETS 300 162:1998 are indicated at the appropriate places throughout this Standard. Strikethrough (~~example~~) identifies ETS tables, figures and passages of text which, for the purposes of this Australian/New Zealand Standard, are deleted. Where Australian/New Zealand tables, figures or passages of text are added, each is set in its proper place and identified by shading (**example**). Added figures are not themselves shaded, but are identified by a shaded border.

This Standard is Part 2 of AS/NZS 4415 series, *Radiotelephone transmitters and receivers for the maritime mobile service operating in the VHF bands—Technical characteristics and methods of measurement*, which is published in parts as follows:

- Part 1: Shipborne equipment and limited coast stations (including DSC)
- Part 2: Major coast stations, limited coast stations, ship stations and hand held stations (non DSC) (this Standard)

The term ‘normative’ has been used in this Standard to define the application of the annex to which it applies. A ‘normative’ annex is an integral part of a Standard.

As this Standard is reproduced from an International Standard, the following applies:

- (a) Its number appears on the cover and title page while the European Standard number appears only on the cover.
- (b) In the source text ‘this European Telecommunications Standard’ should read ‘this Australian/New Zealand Standard’.
- (c) A full point substitutes for a comma when referring to a decimal marker.

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**Radiotelephone transmitters and receivers for the maritime mobile service operating in the VHF bands—Technical characteristics and methods of measurement****Part 2: Major coast stations, limited coast stations, ship stations and handheld stations (non DSC)
(ETS 300 162:1998, MOD)**

Any ETS table, figure or passage of text that is struck-through is not part of this Standard. Any Australian/New Zealand table, figure or passage of text that is added (and identified by shading) is part of this Standard.

1 Scope

~~This ETS 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.~~

This **ETS Standard** 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).

This Standard applies to coast stations and handheld stations designed or intended for the purpose of, or purposes which include, radiotelephony operation in the VHF International Maritime Mobile Service (non DSC).

Where a coast station, limited coast station, ship station or handheld station is designed or intended for—

- (a) the purpose of radiotelephony operation in the VHF International Maritime Mobile Service; and
- (b) another purpose or purposes;

This Standard applies only to that part or those parts of the station necessary for operation in the International Maritime Mobile Service.

This part of the Standard does not apply to equipment forming part of ship stations established aboard vessels subject to Australian legislation under the **Navigation Act 1912**. Refer to AS/NZS 4415.1 for those requirements.

A major coast station is a station established on land primarily for the purpose of communicating with ship stations, including the transmission and reception of messages on behalf of the public.

A limited coast station is a station established on land for the purpose of communicating with ship stations and is not used for the transmission and reception of messages on behalf of the public.

A handheld station is a station designed to be carried on the person and deriving primary power from a replaceable or rechargeable internal battery.

2 Normative references

This ETS Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent references to or revisions of any of these publications apply to this ETS Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

AS	
4295	Analogue speech (angle modulated) equipment operating in land mobile and fixed services bands in the frequency range 29.7 MHz to 1 GHz
AS/NZS	
4415	Radiotelephone transmitters and receivers for the maritime mobile service operating in the VHF bands—Technical characteristics and methods of measurement.
4415.1	Part 1: Shipborne equipment and limited coast stations (including DSC)

- [1] Radio Regulations, Appendix 18 (1990) (WRC-2000): "Table of Transmitting Frequencies in the Band 156 - 174 MHz for Stations in the Maritime Mobile Service".
- [2] Radio Regulations, Appendix 19 (1990): "Technical Characteristics for Transmitters and Receivers used in the Maritime Mobile Service in the Band 156 - 174 MHz".
- [3] ITU-T Recommendation E.161 (1993): "Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network".
- [3a] 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".
- [4] Recommendation ITU-R M.493-8 (1997) (1997): "Digital selective-calling system for use in the maritime mobile service".
- [5] Recommendation ITU-R M.541-7 (1997) (1997): "Operational procedures for the use of digital selective-calling (DSC) equipment in the maritime mobile service".
- [6] 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".
- [7] IMO Resolution A.524(13): "Performance Standard for VHF Multiple Watch facilities".
- [8] ITU-T Recommendation P.53 (1988): "Psophometer for use on telephone-type circuits".

- [9] IEC 1162-1 (1995-11): "Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners".
- [10] ETS 300 828 (1997): "Radio Equipment and Systems (RES); ElectroMagnetic Compatibility (EMC) for radiotelephone transmitters and receivers for the maritime mobile service operating in the VHF bands".
- [11] ETR 028: "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".
- [12] ETS 300 338: "Radio Equipment and Systems (RES); 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".
- [13] ITU-R Recommendation SM 332-4: "Selectivity of receivers".
- [14] EN 301 178 V1.1.1 (1999-05): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Technical characteristics and methods of measurement for portable Very High Frequency (VHF) radiotelephone equipment for the maritime mobile service operating in the VHF bands (non-GMDSS applications only)".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purpose of this ~~ETS~~ **Standard**, the following definitions apply:

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: The ratio between the frequency deviation and the modulation frequency.

performance check: A check of:

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

3.2 Symbols

For the purposes of this ~~ETS~~ **Standard**, the following symbols apply:

dBa relative to 2×10^{-5} Pa
e.m.f. electromotive force

3.3 Abbreviations

For the purposes of this ~~ETS~~ **Standard**, the following abbreviations apply:

ad amplitude difference
DSC Digital Selective Calling
EUT Equipment Under Test
fd frequency difference

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FSI	Frequency Set Information
RF	Radio Frequency
rms	root mean square
SFI	Scanning Frequency Information
SINAD	Signal + Noise + Distortion / Noise + Distortion
VHF	Very High Frequency

4 General and operational requirements

Major Coast Station Equipment must meet the requirements of AS 4295 and the frequency error test (8.1) plus the frequency response test (8.5) of this Standard. In marine operations, mandatory quiet base (MQB) facilities may be disabled.

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].

A device shall be capable of operation only on a channel designated in the first column of Table 1A, being a channel whose transmit and receive nominal carrier frequency is specified in—

- (a) the second and third column respectively opposite that channel in the case of a handheld station, ship station or limited coast station; and
- (b) the fourth and fifth column respectively opposite that channel in the case of a major coast station.

Where an alternate set of channels, in addition to those specified in this Clause is available, the device shall—

- (i) provide a clear indication of which set of channels is in use; and
- (ii) be designed so that the channel set on which the device operates at switch-on corresponds to that specified in this Clause.

A device shall operate on only one channel at any one time.

TABLE 1A
CHANNEL OPERATION

Channel number	Shipstation, limited coast station and handheld		Major coast station	
Column 1	Column 2	Column 3	Column 4	Column 5
	Transmit	Receive	Transmit	Receive
01	60	156.025	160.625	156.025
		156.050	160.650	156.050
02	61	156.075	160.675	156.075
		156.100	160.700	156.100
03	62	156.125	160.725	156.125
		156.150	160.750	156.150
04	63	156.175	160.775	156.175
		156.200	160.800	156.200
05	64	156.225	160.825	156.225
		156.250	160.850	156.250
06	65	156.275	160.875	156.275
		156.300	—	—
07	66	156.325	160.925	156.325
		156.350	160.950	156.350
08	67	156.375	156.375	156.375
		156.400	—	—
09	68	156.425	156.425	156.425
		156.450	156.450	156.450
10	69	156.475	156.475	156.475
		156.500	156.500	156.500
11	70 ¹⁾	156.525	156.525	156.525
		156.550	156.550	156.550
12	71	156.575	156.575	156.575
		156.600	156.600	156.600
13	72	156.625	—	—
		156.650	156.650	156.650
14	73	156.675	156.675	156.675
		156.700	156.700	156.700
15	74	156.725	156.725	156.725
		156.750	156.750	156.750
16	75	156.775	—	—
		156.800	156.800	156.800
17	76	156.825	—	—
		156.850	156.850	156.850
18	77	156.875	—	—
		156.900	161.500	156.900
(continued)				

(continued)

A1

TABLE 1A (continued)

Channel number	Shipstation, limited coast station and handheld		Major coast station	
	Column 2	Column 3	Column 4	Column 5
	Transmit	Receive	Transmit	Receive
78	156.925	161.525	161.525	156.925
19	156.950	161.550	161.550	156.950
79	156.975	161.575	161.575	156.975
20	157.000	161.600	161.600	157.000
80	157.025	161.625	161.625	157.025
21	157.050	161.650	161.650	157.050
81	157.075	161.675	161.675	157.075
22	157.100	161.700	161.700	157.100
82	157.125	161.725	161.725	157.125
23	157.150	161.750	161.750	157.150
83	157.175	161.775	161.775	157.175
24	157.200	161.800	161.800	157.200
84	157.225	161.825	161.825	157.225
25	157.250	161.850	161.850	157.250
85	157.275	161.875	161.875	157.275
26	157.300	161.900	161.900	157.300
86	157.325	161.925	161.925	157.325
27	157.350	161.950	161.950	157.350
87 ²⁾	157.375	157.375	—	—
28	157.400	162.000	162.000	157.400
88 ²⁾	157.425	157.425	—	—
AIS 1 ²⁾	161.975	161.975	161.975	161.975
AIS 2 ²⁾	162.025	162.025	162.025	162.025
NOTES				
1) Ch 70 restricted to digital selective calling for distress, safety and calling.				
2) Ch 87 and 88 revert from duplex to simplex operation as per Appendix 18 (WRC2000) and the remaining (upper pair) frequencies become channels AIS 1 and AIS 2, to be used for an automatic ship identification and surveillance system. Ref:ITU-RM 1371.				

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 an Administration, before installation on board ships. It shall not be possible for the user to unblock or block these additional channels.

The equipment shall be so designed that use of channel 70 for purposes other than Digital Selective Calling (DSC) is prevented (see Recommendation ITU-R M.493-8 [4] and Recommendation ITU-R M.541-8 [5]).

The equipment should be so designed that the use of channels AIS1 and AIS2 for purpose other than ship automatic identification systems (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). ~~Where an input panel on the equipment for entering the digits 0—9 is provided, this shall conform to ITU-T Recommendation E.161 [3].~~ Conformance with CCITT Recommendation E.161[3] is not a requirement.

The equipment shall have the following additional controls and indicators (see IMO Resolution A.803(19) [6]):

- 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. The loudspeaker on/off switch is not a requirement.
- 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 for power levels above 0.1 W output.

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.~~ Means for earthing exposed metal parts is not a requirement.

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) [6]).

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 (see Radio Regulations, Appendix 19 [2]). (See also ITU-R M.489-2)

The equipment shall be designed to operate satisfactorily with a channel separation of 25 kHz. (See ITU-R M.489-2)

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) [7]):

- 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. As an alternative to simultaneous display the sequential display of channel numbers is also permitted;
- 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.

5.3.2 Scanning characteristics

When the scanning facility is switched on, the priority channel shall be sampled with a sampling period of not more than 2 s. If a signal is detected on the priority channel the receiver shall remain on this channel for the duration of that signal.

If a signal is detected on the additional channel the sampling of the priority channel shall continue, thus interrupting the reception on the channel for periods as short as possible and not greater than 150 ms.

The design of the receiver shall provide for its proper functioning during the period the priority channel is sampled since the receiving conditions on the priority channel may differ from those on the additional channel.

In the absence of a signal on the priority channel, and, during reception of a signal on the additional channel, the duration of each listening period on this channel shall be at least 850 ms.

Means shall be provided to indicate the channel on which a signal is being received.

5.4 DSC controller interfaces

(This clause is not a requirement.)

~~The equipment shall have DSC signal input and output impedances of 600 Ω , symmetrical and free of earth.~~

~~If the equipment is designed as an integral unit or fitted with digital interface to a DSC controller, the equipment shall also comply with the relevant requirements of ETS 300 338 [12], as an integral equipment.~~

5.4.1 Operational interfaces

~~The interface for control shall comply with IEC 1162-1 [9].~~

~~The protocols shall at least comply to Frequency Set Information (FSI) (see annex C). Transmitter key input interface shall be a 2-wire circuit closure to transmit with a maximum/minimum open circuit voltage of 50 V and a maximum closed circuit current of 400 mA.~~

~~Readily available commercial connections should be used. Manufacturers shall provide means for user identification of the connectors used.~~

5.5 Time-out-timer (TOT) (Required for ship stations and hand helds)

5.5.1 Definition

A facility that disables the transmitter after a preset transmission period. Re-activation of the transmitter (following disabling by the TOT) is initiated only after the de-activation and re-activation of the transmit control circuitry.

5.5.2 Requirements

TOT circuitry shall be enabled when utilizing a manually operated press-to-talk (PTT) switch.

The TOT shall activate within 5 minutes of constant transmission.

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 , 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

Unless otherwise specified, the receiver squelch facility shall be made inoperative 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 Arrangements for test signals applied to the transmitter input

For the purpose of this ~~ETS~~ Standard, the audio frequency modulating signal applied to the transmitter shall be produced by a signal generator applied to the connection terminals replacing the microphone transducer.

6.6 Test channels

Tests shall be made on channel 16 unless otherwise stated.

6.7 Measurement uncertainty and interpretation of the measured results

6.7.1 Measurement uncertainty

Table 1: Absolute measurement uncertainties: maximum values

Parameter	Maximum uncertainty
RF frequency	$\pm 1 \times 10^{-7}$
RF power	$\pm 0,75$ dB
Maximum frequency deviation: - within 300 Hz to 6 kHz of audio frequency - within 6 kHz to 25 kHz of audio frequency	± 5 % ± 3 dB
Deviation limitation	± 5 %
Adjacent channel power	± 5 dB
Conducted spurious emission of transmitter	± 4 dB
Audio output power	$\pm 0,5$ dB
Amplitude characteristics of receiver limiter	$\pm 1,5$ dB
Sensitivity at 20 dB SINAD	± 3 dB
Conducted emission of receiver	± 3 dB
Two-signal measurement	± 4 dB
Three-signal measurement	± 3 dB
Radiated emission of transmitter	± 6 dB
Radiated emission of receiver	± 6 dB
Transmitter transient time	± 20 %
Transmitter transient frequency	± 250 Hz
Receiver desensitization (duplex operation)	$\pm 0,5$ dB

For the test methods according to this ~~ETS~~ Standard the uncertainty figures are valid to a confidence level of 95 % calculated according to the methods described in ETR 028 [11].