

Australian/New Zealand Standard™

**Amplitude modulated equipment for use
in the aeronautical radio service in the
frequency range 118 MHz to 137 MHz**



AS/NZS 4583:2010

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The following are represented on Committee RC-006:

AirServices Australia
Australian Communications and Media Authority
Australian Industry Group
Australian Radio Communications Industry Association
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Amplitude modulated equipment for use in the aeronautical radio service in the frequency range 118 MHz to 137 MHz

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee RC-006, Radiocommunications Equipment—General to supersede AS/NZS 4583:1999. The Standard was originally developed from Airservices Australia specification YSCE 3087, Issue 1. It replaces older Australian Government specifications, Equipment Compliance Requirements 203A and 272A. It is one of a series of Standards dealing with radiocommunications equipment, under the terms of a Memorandum of Understanding between Standards Australia and the Australian Communications and Media Authority.

This Standard incorporates Amendment No. 1 (July 2012). 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 users, manufacturers and suppliers of radiocommunications equipment intended to operate in the aeronautical mobile band at frequencies in the range 118 MHz to 137 MHz, with the minimum technical performance characteristics required for use in the Australian and New Zealand radio spectrum, including methods of test and measurement.

The purposes of this revision are to:

- (a) Correct a number of errors that have been reported in the Standard.
- (b) Introduce parallel ETSI approval arrangements for portable equipment in Australia and New Zealand to help reduce associated development and testing costs involved in marketing these models. Similar arrangements have been implemented in the land mobile radio service Standards AS/NZS 4295 and AS/NZS 4768.1. The acceptance of the ETSI standards testing in this case is proposed with the addition of the Australian ‘time out timer’ requirement, and testing of transmitter spurious emission at extremes.

The term ‘normative’ has been used in this Standard to define the application of the Appendix. A ‘normative’ appendix is an integral part of a Standard.

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**Amplitude modulated equipment for use in the aeronautical radio service in the frequency range 118 MHz to 137 MHz**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies the technical performance characteristics, test methods and minimum requirements for radiocommunications equipment operating in the aeronautical radio service in the frequency range 118 MHz to 137 MHz using amplitude modulation and 25 kHz channel spacing.

This Standard specifies the requirements for land-based base stations, mobiles, and personal mobile equipment and equipment used in conjunction with activities such as aviation sport and as otherwise specified by the appropriate aviation regulatory authority. The Standard does not apply to fixed equipment installations in aircraft.

1.2 DEFINITIONS

For the purposes of this Standard, the definitions below apply.

1.2.1 Artificial load

A non-reactive, non-radiating load whose impedance as presented to the transmitter corresponds to the terminal impedance of the antenna normally connected to the transmitter.

NOTE: This is normally 50 Ω .

1.2.2 Audio frequency test load

An impedance network that replaces the load to which the receiver is connected under normal operating conditions. It simulates the impedance of the normal load and any cables with which it is normally used.

NOTE: The audio frequency test load usually consists of a single pure resistance.

1.2.3 Base station

A radiocommunications transmitter, receiver or transceiver fitted with an antenna connector, for use with an external antenna and suitable for use at a fixed location.

1.2.4 Battery end of life voltage

The manufacturer's declared voltage below which the battery is incapable of operating the equipment in accordance with the manufacturer's stated specifications.

1.2.5 Carrier power (transmitter)

The mean power delivered to the artificial load during a single radiofrequency cycle, in the absence of modulation.

1.2.6 Combining network

An impedance matching network intended to facilitate the connection of two or more test signal sources to the receiver input.

1.2.7 Conducted spurious radiation (receiver)

Radiofrequency signals generated from components and wiring within the receiver and which are radiated by way of conduction from the radiofrequency terminals of the receiver.

1.2.8 Frequency error (transmitter)

The difference between the measured carrier frequency and its nominal value.

1.2.9 Mobile station

A radiocommunications transmitter, receiver or transceiver fitted with an antenna connector and intended for use from a vehicle in motion or during halts at unspecified points.

1.2.10 Necessary bandwidth

The bandwidth that is just sufficient to ensure the transmission of information at the rate and with the quality required.

1.2.11 Personal mobile station

A radiocommunications transmitter, receiver or transceiver incorporating an integral antenna and intended to be carried on the person or held in the hand.

1.2.12 Rated audio output power

The maximum power declared by the manufacturer at the audio frequency test load, under standard test conditions and with standard test modulation.

1.2.13 Rated receiver sensitivity

The minimum level of radiofrequency signal declared by the manufacturer with standard test modulation and under standard test conditions that is required to produce a SINAD of 12 dB at the audio test load.

1.2.14 Rated transmitter output power

The maximum power declared by the manufacturer available at the transmitter output, under standard test conditions, when the equipment is operated into the artificial load.

1.2.15 Reference audio output power

The power level 6 dB below the rated audio output power.

1.2.16 Reference receiver sensitivity

The minimum signal level at the receiver input of a radiofrequency signal at the nominal frequency of the receiver and with standard test modulation which will produce—

- (a) reference audio output power; and
- (b) SINAD ratio of 12 dB at the audio frequency test load.

1.2.17 SINAD

A measure of the audio output power of the receiver, expressed in decibels, equal to the ratio of the power of the signal-plus-noise-plus-distortion to the power of the noise-plus-distortion at the audio frequency test load (signal + noise + distortion/noise + distortion).

NOTE: This measurement does not use weighting filters (i.e. telephony pass band filters).

1.2.18 Spurious emission (transmitter)

Emissions on a frequency or frequencies other than those of the carrier and sidebands associated with normal modulation.

1.2.19 Time-out timer (TOT)

A facility which disables the transmitter after a preset transmission period.

1.3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

ETSI

EN 300 676-1 V1.4.1 Electromagnetic compatibility and Radio Spectrum Matters (ERM):
(2007-04) Ground-based VHF hand-held, mobile and fixed radio transmitters,
receivers and transceivers for the VHF aeronautical mobile service
using amplitude modulation
Part 1: Technical characteristics and methods of measurement

ITU-T

Recommendation Selectivity of receivers
SM 332-4

SECTION 2 TEST CONDITIONS

2.1 GENERAL

2.1.1 Alternative testing path

If the equipment to be tested for compliance is hand-held (personal mobile) then the alternative testing path at Appendix A, which uses the Standard ETSI EN 300 676-1 V1.4.1 (2007-04) with some additions, is an acceptable alternative method of testing.

2.1.2 Test condition application

All tests shall be carried out under standard test conditions, see Clause 2.2. Tests shall also be carried out under extreme conditions where stated, see Clauses 2.3 and 2.4.

2.1.3 Combining networks

The impedance as presented to the receiver shall correspond to the terminal impedance of the antenna normally connected to the receiver. This requirement shall be met whether one or more signals are applied to the receiver simultaneously.

All signal levels are expressed in dBm and are referenced at the receiver input terminals.

2.1.4 Artificial load

Where the transmitter is designed for operation into a non-standard load (i.e. other than 50 Ω) a suitable matching arrangement to 50 Ω shall be used.

2.1.5 Audio frequency test load

The load to which the receiver audio output is normally connected shall be replaced with an audio frequency test load.

2.1.6 Standard test modulation (transmitter)

Standard test modulation shall be a 1000 Hz sinusoid at a level sufficient to provide a 60% modulation depth.

2.1.7 Standard test modulation (receiver)

The standard test signal to be applied to the receiver shall be amplitude modulated to a depth of 30% with a modulation frequency of 1000 Hz.

2.1.8 Impulse noise test signal

The impulse noise test signal shall be a pulsed signal with pulse repetition rates of up to 200 pps with pulse duration of 0.3 ms, peak voltages of 50, 75 and 100 μ V.

2.1.9 Test power source

During testing, the power source of the equipment shall be replaced by a test source capable of producing standard and extreme test voltages. The internal impedance of the test power source shall be low enough for its effect on the test to be negligible. For the purpose of the tests, the voltage of the power source shall be measured at the input terminals of the equipment.

2.1.10 Test frequency

The test frequency shall be 129.1 MHz.

NOTE: For the purposes of the alternative test path of Appendix A the test frequency may be varied to comply with Clause 6.3 of European standard ETSI EN 300 676-1 V1.4.1 (2007-04).

The following frequencies are reserved for the purposes specified and shall not be used for test purposes under any circumstances:

- (a) 121.5 MHz international distress and rescue beacon frequency.
- (b) 123.1 MHz search and rescue 'on site' frequency and inter-pilot frequency.
- (c) 131.0 MHz Australian Emergency Services coordination.

2.1.11 Receiver mute control

For testing purposes, the receiver mute shall be made inoperative except for the muting test in Clause 3.3.10.

2.2 STANDARD TEST CONDITIONS

2.2.1 Temperature and humidity

The temperature and humidity conditions for tests may be any convenient combination of ambient temperature and humidity within the following ranges:

- (a) Temperature: +15°C to +30°C.
- (b) Relative humidity: 20% to 75%.

2.2.2 Test power source

2.2.2.1 A.C. mains voltage

The standard test source voltages for equipment to be connected to the a.c. mains network shall be the nominal mains voltage and frequency (230 V at 50 Hz).

2.2.2.2 Equipment intended for operation from a 12 V regulated charging vehicle system

When the equipment is intended for operation in a vehicle with the usual 12 V secondary (rechargeable) lead-acid battery and regulated charging system, the standard test voltage shall be 1.15 times the nominal voltage of the battery (e.g. 13.8 V).

2.2.2.3 Other secondary battery systems

When the equipment is powered by other types of secondary (rechargeable) battery systems, the standard test voltage shall be the nominal voltage of the battery when fully charged but not connected to the charging system.

2.2.2.4 Other power sources

For operation from other power sources or types of battery, the standard test voltage shall be that declared by the equipment manufacturer.

2.3 EXTREME TEST CONDITIONS

2.3.1 Extreme temperatures

For tests at extreme temperatures, measurements shall be made in accordance with the procedures specified in Clause 2.4, at an upper limit of +60°C and a lower limit of -10°C. For personal mobile stations, the upper limit shall be +50°C.

2.3.2 Extreme test voltages

2.3.2.1 A.C. mains voltage

The extreme test voltages for a.c. mains powered equipment shall be 0.89 and 1.1 times the nominal voltage at the nominal frequency.

2.3.2.2 Primary (non rechargeable) batteries

The extreme test voltages for equipment powered by a primary (non rechargeable) battery shall be the battery's nominal voltage as declared by the equipment manufacturer and 0.7 times the nominal voltage.

2.3.2.3 Secondary (rechargeable) batteries

The extreme test voltages for equipment powered by a secondary (rechargeable) battery where the equipment design permits the equipment to be operated whilst batteries are being charged shall be 1.2 times and 0.85 times the battery nominal voltage as declared by the equipment manufacturer.

The extreme test voltages for equipment powered by a secondary (rechargeable) battery where the equipment design does not permit the equipment to be operated whilst batteries are being charged shall be 1.0 and 0.85 times the battery nominal voltage as declared by the equipment manufacturer.

2.3.2.4 Other power sources

For equipment using other power sources, or capable of being operated from a variety of power sources, the extreme test voltages shall be those agreed between the equipment manufacturer and the testing authority, and shall be recorded with the test results.

2.4 PROCEDURE FOR TESTS AT EXTREME TEMPERATURES

2.4.1 General

Before measurements are made the equipment shall have reached thermal balance in the test chamber. The equipment shall be switched off during the temperature stabilizing period. The sequence of measurements shall be chosen so that excessive condensation does not occur.

In the case of equipment containing temperature stabilization circuits designed to operate continuously, the temperature stabilization circuits may be switched on for 15 min after thermal balance has been attained.

2.4.2 Procedure for equipment designed for continuous operation

If the manufacturer states that the equipment is designed for continuous operation, the test procedure shall be as follows. Before tests at the upper temperature, the equipment shall be placed in the test chamber and left until thermal balance is attained. The equipment shall then be switched on in the transmit condition for a period of 30 min after which the equipment shall meet the specified requirements. For tests at the lower temperature the equipment shall be left in the test chamber until thermal balance is attained, then switched to the stand-by or receive condition for 1 min after which the equipment shall meet the specified requirements.

2.4.3 Procedure for equipment designed for intermittent operation

If the manufacturer states that the equipment is designed for intermittent operation, the test procedure shall be as given in the following paragraph.

Before tests at the upper temperature, the equipment shall be placed in the test chamber and left until thermal balance is attained. The equipment shall then be switched on for 1 min in the transmit condition, followed by 4 min in the receive condition, after which the equipment shall meet the specified requirements. For tests at the lower temperature, the equipment shall be left in the test chamber until thermal balance is attained, then switched to the stand-by or receive condition for 1 min after which the equipment shall meet the specified requirements.

SECTION 3 EQUIPMENT REQUIREMENTS

3.1 GENERAL REQUIREMENTS

3.1.1 Equipment markings

Many radio transmitting products in Australia and New Zealand are subject to mandatory labelling requirements in accordance with notices issued by the Australian Communications and Media Authority under section 182 of the *Australian Radiocommunications Act 1992*, and the Ministry of Economic Development under section 134(1)(g) of the *New Zealand Radiocommunications Act 1989*. Suppliers of radio transmitters should familiarize themselves with these requirements before supplying products.

3.1.2 Adjustment mechanisms

Any adjustment mechanism, which could enable the equipment performance to be altered so that the requirements of this Standard are not met, shall be contained within the housing of the equipment and shall not be externally accessible.

Any means of programming the equipment that could enable the equipment performance to be altered so that the requirements of this Standard are not met shall be protected from user access.

NOTE: Ways to protect access could include the use of control mechanisms such as restricted passwords, restricted issue software, hidden menus not available in normal operation, hardware means including the need to use a restricted issue dongle or specialized cable.

3.1.3 Indicators

The equipment shall have the following indicators:

- (a) An indicator showing the specific frequency at which the equipment is set to operate.
- (b) In transmitters, an output power detector giving a visual indication that the carrier is being produced.

3.1.4 Vehicle adaptors for personal mobile stations

3.1.4.1 Affected radiofrequency performance

Where the vehicle adaptor incorporates features that may affect the radiofrequency performance of the personal mobile station (such as a power amplifier), the composite equipment shall operate to the mobile requirements of this Standard.

3.1.4.2 Unaffected radiofrequency performance

Where the vehicle adaptor incorporates features that do not affect the radiofrequency performance of the personal mobile station (such as external speaker facilities), the personal mobile shall additionally meet the requirements of the following mobile station parameters:

- (a) Transmitter frequency error.
- (b) Spurious emissions (transmitter).
- (c) Conducted spurious radiation (receiver).

These parameters shall be met at the mobile station temperature limits where testing under extreme test conditions is required.