SLOVENSKI STANDARD
SIST EN 300 676 V1.2.1:2003

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Elektromagnetna združljivost in zadeve v zvezi z radijskim spektrom (ERM) ï Talni VHF roļ ni, mobilni in fiksni radijski oddajniki, sprejemniki in sprejemniki-oddajniki za VHF aeronavtiļ no mobilno storitev, ki uporablja amplitudno modulacijo ï Tehniļ ne karakteristike in merilne metode

ElectroMagnetic Compatibility and Radio Spectrum Matters (ERM); Ground-based VHF hand-held, mobile and fixed radio transmitters, receivers and transceivers for the VHF aeronautical mobile service using amplitude modulation; Technical characteristics and methods of measurement

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

National transposition dates	
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Introduction

The present document states the minimum performance requirements for ground based radio transmitters, transceivers and receivers for the aeronautical mobile service operating in the VHF band (118 MHz to 136,975 MHz), using Double Sideband Amplitude Modulation with 8,33 kHz or 25 kHz channel spacing.

The present document may be used by accredited test laboratories for the assessment of the performance of the equipment. The performance of the equipment submitted for type testing should be representative for the performance of the corresponding production model.

The present document has been written on the assumption that:

- the type test measurements will be performed only once, in an accredited test laboratory and the measurements accepted by the various authorities in order to grant type approval;
- if equipment available on the market is required to be checked it will be tested in accordance with the methods of measurement specified in the present document.

1 Scope

The present document states the minimum performance requirements for radio transmitters receivers and transceivers at ground-based aeronautical stations operating in the VHF band (118 MHz to 136,975 MHz) allocated to the aeronautical mobile service.

The present document applies to DSB AM systems, with channel separations of 8,33 kHz or 25 kHz intended for analogue speech and ground base stations with a channel spacing of 25 kHz intended for ACARS data communication.

The scope of the present document is limited to ground base stations, ground mobile and hand held radios for ground use.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

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

[2] ICAO Annex 10 Volume V (1996): "Aeronautical Radio Frequency Spectrum Utilization".

[3] ITU-T Recommendation P.53: "Psophometer for use on telephone-type circuits".

[4] ISO 7637 Road vehicles, Electrical disturbance by conducting and coupling (Parts 1 & 2).

3 Definitions and abbreviations

3.1 Definitions

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

Types of measurements:

conducted measurements: measurements which are made using a direct RF connection to the equipment under test

radiated measurements: measurements which involve the measurement of a radiated field

aeronautical mobile service: mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate

Type of station:

ground base station: aeronautical station equipment, in the aeronautical mobile service, for use with an external antenna and intended for use at a fixed location

mobile station: radio equipment designed for permanent or temporary vehicle installation and operation, including provision for vehicle DC power supply, and connections for external antenna, PTT key, microphone, speaker and / or headphone

portable station: radio equipment with integral battery for independent hand-carried use. Provisions may be made for connections of an external antenna, PTT key, microphone, headphone and charger, but principally to be operated as a self contained unit

hand held: radio equipment with integral batteries, designed to be hand portable and operated hand held

integral antenna equipment: radio communications equipment with an antenna integrated into the equipment without the use of an external connector and considered to be part of the equipment. An integral antenna may be internal or external to the equipment. In equipment of this type, a 50 Ω RF connection point shall be provided for test purposes. A connection point for an AF modulating input and for AF output measurements shall also be provided

non-integral antenna equipment: radio communications equipment with a connector intended for connection to an antenna

3.2 Abbreviations

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

ACARS	Aircraft Communications Addressing and Reporting System
AF	Audio Frequency
AGC	Automatic Gain Control
AM	Amplitude Modulation
dBc	dB relative to the carrier power
DSB	Double Side Band
I/P	Input
ICAO	International Civil Aviation Organization
IF	Intermediate Frequency
O/P	Output
ppm	parts per million
RF	Radio Frequency
rms	root mean square
SINAD	(Signal + Noise + Distortion)/(Noise + Distortion)
VSWR	Voltage Standing Wave Ratio

4 General requirements

8,33 kHz equipment shall be able to operate on all channels in the List of Assignable Frequencies defined in Appendix 2, chapter 4, Group F (subclause 4.1.8.1.2) of the ICAO Annex 10 Volume V [2].

The channel labelling used for 8,33 kHz channel spacing is based on a frequency-channel pairing in accordance with table 4.1 (bis) of ICAO Annex 10 Volume V [2] subclause 4.1.2.4.

25 kHz equipment shall be able to operate on the frequencies 118,0 MHz to 136,975 MHz in accordance with ICAO Annex 10 Volume V [2], Appendix to Chapter 4.

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.

4.1 Controls and indicators

The equipment shall have the following controls and indicators as a minimum:

- a visual indication that the device is switched on;
- a facility to disable the squelch for test purposes;
- a visual indication that the carrier is being produced.

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.

4.2 Class of emission and modulation characteristics

The equipment shall use Double Side Band (DSB) Amplitude Modulation (AM) full carrier, (6K80A3EJN for 25 kHz, 5K00A3EJN for 8,33 kHz), for speech and 13k0A2D for data. The equipment shall be designed to operate satisfactorily with a channel separation of 8,33 kHz or 25 kHz.

4.3 Warm up

After being switched on the equipment shall be operational within five seconds (ten seconds for hand held radios) and shall meet the requirements of the present document within one minute under normal test conditions (subclause 5.3).

If the equipment includes parts which require to be heated in order to operate correctly (e.g. crystal ovens) a warming-up period of 30 minutes of those parts shall be allowed.

5 Test conditions, power sources and ambient temperatures

5.1 Normal and extreme test conditions

Measurements shall be made under normal test conditions (subclause 5.3) and also, where stated, under extreme test conditions (subclauses 5.4.1 and 5.4.2 applied simultaneously).

5.2 Test power source

During testing, the equipment shall be supplied from a test power source capable of producing normal and extreme test voltages.

The internal impedance of the test power source shall be low enough for its effect on the test results to be negligible. For the purpose of testing the power source voltage shall be measured at the input terminals of the equipment.

During testing, the power source voltages shall be maintained within a tolerance of ±3 % relative to the voltage level at the beginning of each test.

5.3 Normal test conditions

5.3.1 Normal temperature and humidity

The normal temperature and humidity conditions for tests shall be a combination of temperature and humidity within the following ranges:

- temperature: +15°C to +35°C;
- relative humidity: 20 % to 75 %.

When it is impracticable to carry out the tests under these conditions, a note to this effect, stating the ambient temperature and relative humidity during the tests, shall be added to the test report.

5.3.2 Normal power sources

5.3.2.1 Mains voltage and frequency

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage.

For the purpose of the present document, the nominal voltage shall be the declared voltage or any of the declared voltages for which the equipment was designed.

The frequency of the test power source corresponding to the AC mains shall be between 49 Hz and 51 Hz.

5.3.2.2 Regulated lead-acid battery power sources used on vehicles

When the radio equipment is intended for operation from the usual types of regulated lead-acid battery power source used on vehicles, the normal test voltage shall be 1,1 times the nominal voltage of the battery (6 V, 12 V etc.).

5.3.2.3 Other power sources

For operation from other power sources or types of battery (primary or secondary), the normal test voltage shall be that declared by the equipment manufacturer.

5.4 Extreme test conditions

5.4.1 Extreme temperatures

For tests at extreme temperatures, measurements shall be made in accordance with subclause 5.5, at a lower temperature of -20°C and an upper temperature of +55°C. This test shall be performed at the nominal supply voltage as defined in subclause 5.3.2

5.4.2 Extreme values of test power sources

5.4.2.1 Mains voltage

The extreme test voltages shall be between 207 V and 253 V. This test shall be performed at the normal temperature and humidity as defined in subclause 5.3.1.

The frequency of the test voltage shall be between 49 Hz and 51 Hz.

5.4.2.2 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 laboratory and shall be recorded in the test report. Equipment intended for vehicle installation shall meet the power supply requirements of ISO 7637 [4].