



SLOVENSKI STANDARD

SIST ETS 300 296:1998

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Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment using integral antennas intended primarily for analogue speech

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**Radio Equipment and Systems (RES);
Land mobile service
Technical characteristics and test conditions for
radio equipment using integral antennas
intended primarily for analogue speech**

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Foreword

This European Telecommunication Standard (ETS) has been prepared by the Radio Equipment and Systems (RES) Technical Committee of the European Telecommunications Standards Institute (ETSI).

Annex A provides additional information concerning radiated measurements.

Annex B contains normative specifications for adjacent channel power measurement arrangements.

Annex C is a graphic representation of the normative subclause 4.1, referring to the presentation of equipment for testing purposes.

Annex D contains specifications for the test discriminator used in transient measurements.

Transposition dates	
Date of latest announcement of this ETS (doa):	31 March 1995
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	30 September 1995
Date of withdrawal of any conflicting National Standard (dow):	30 September 1995

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Introduction

This ETS was drafted on the assumption that:

- the type test measurements performed in an accredited test laboratory in one country would be accepted by the Type Approval Authority in another country provided that the national regulatory requirements are met;
- if equipment available on the market is required to be checked it should be tested in accordance with the methods of measurement specified in this ETS.

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1 Scope

This ETS is intended to specify the minimum performance and the methods of measurement of radio equipment for use in the land mobile service as specified in the Scope. Clause 5 provides the corresponding limits. These limits have been chosen to ensure an acceptable grade of service and to minimise harmful interference to other equipment and services. They are based on the interpretation of the measurement results described in subclause 4.3.

This ETS covers the minimum characteristics considered necessary in order to make the best use of the available frequencies. It does not necessarily include all the characteristics which may be required by a user, nor does it necessarily represent the optimum performance achievable. It applies to equipment with integral antennas, used in angle modulation systems in the land mobile service, operating on radio frequencies between 30 MHz and 1 000 MHz, with channel separations of 12,5 kHz, 20 kHz and 25 kHz, and is intended primarily for analogue speech.

This ETS is based upon CEPT Recommendation T/R 24-01 annex III [1], and is a general standard which may be superseded by specific standards covering specific applications.

In this ETS different requirements are given for the different radio frequency bands, channel separations, environmental conditions and types of equipment, where appropriate.

The measurement methods have been adapted from ETR 027 [3] where possible.

The type of equipment covered by this ETS is handportable stations with integral antennas.

This ETS covers angle modulation to be used for radio equipment, but individual national administrations are free to choose the type of modulation. Channel separations, maximum transmitter output power/effective radiated power and the inclusion of automatic transmitter shut-off facility may all be conditions attaching to the issue of a licence by the appropriate administration.

This ETS is complementary to ETS 300 086 [2] which covers radio equipment with an internal or external RF connector, for use in the land mobile service. It is primarily intended for omnidirectional applications.

Equipment which also includes an external or internal RF connector should be type tested to the requirements of ETS 300 086 [2] using this connector.

Additional standards or specifications may be required for equipment such as that intended for connection to the Public Switched Telephone Network (PSTN).

This ETS does not cover requirements for radiated emissions below 30 MHz.

This ETS may also 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. In order to avoid any ambiguity in that assessment, this ETS contains instructions for the presentation of equipment for type testing purposes (clause 4), conditions (clause 6) and measurement methods (clauses 8 and 9).

2 Normative references

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

- [1] CEPT Recommendation T/R 24-01 annex III: "Technical characteristics and test conditions for radio equipment using integral antenna in the Land Mobile Service".
- [2] ETS 300 086: "Radio Equipment and Systems; Land mobile service: Technical characteristics and test conditions for radio equipment with an internal or external RF connector intended primarily for analogue speech".
- [3] ETR 027: "Radio Equipment and Systems; Methods of measurement for mobile radio equipment".
- [4] ETR 028: "Radio Equipment and Systems; Uncertainties in the measurement of mobile radio equipment characteristics".
- [5] CCITT Recommendation Blue Book O.41 (1988): "Psophometer for use on telephone-type circuits".

3 Definitions, abbreviations and symbols

3.1 Definitions

For the purpose of this ETS, the following definitions apply:

angle modulation: Either phase modulation (G3) or frequency modulation (F3).

audio frequency load: The audio frequency load is normally a resistor of sufficient power rating to accept the maximum audio output power from the equipment under test. The value of this resistor should be that stated by the manufacturer and equal to the impedance of the audio transducer at 1 000 Hz. In some cases it may be necessary to place an isolating transformer between the output terminals of the receiver under test and the load.

audio frequency termination: The audio frequency termination is any connection other than the audio frequency load which may be required for the purpose of testing the receiver. The termination device should be agreed between the manufacturer and the testing laboratory and details included in the test report. If special equipment is required then it should be provided by the manufacturer.

band-stop filter (for the SINAD meter): The characteristics of the band-stop filter used in the audio distortion factor meter and SINAD meter should be such that at the output the 1 000 Hz tone will be attenuated by at least 40 dB and at 2 000 Hz the attenuation will not exceed 0,6 dB. The filter characteristic shall be flat within 0,6 dB over the ranges 20 Hz to 500 Hz and 2 000 Hz to 4 000 Hz. In the absence of modulation the filter must not cause more than 1 dB attenuation of the total noise power of the audio frequency output of the receiver under test.

integral antenna: An antenna designed to be connected to the equipment without the use of a 50 Ω external connector and considered to be part of the equipment. An integral antenna may be fitted internally or externally to the equipment.

psophometric weighting network: The psophometric weighting network is described in CCITT Recommendation Blue Book O.41 [5].

Types of measurements:

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

radiated measurements: Measurements which involve the absolute measurement of a radiated field.

Types of station:

base station: Equipment fitted with an antenna socket, for use with an external antenna and intended for use in a fixed location.

handportable station: Equipment either fitted with an antenna socket or an integral antenna, or both, normally used on a stand-alone basis, to be carried on a person or held in the hand.

mobile station: Mobile equipment fitted with an antenna socket, for use with an external antenna, normally used in a vehicle or as a transportable station.

Types of tests:

full tests: In all cases except where qualified as "limited", tests are performed according to this ETS.

limited tests: The limited tests, subclause 4.1, are as follows:

- receiver average usable sensitivity (field strength), subclause 9.1;
- receiver adjacent channel selectivity, subclause 9.4;
- transmitter frequency error, subclause 8.1;
- transmitter effective radiated power, subclause 8.2;
- transmitter adjacent channel power, subclause 8.4.

3.2 Abbreviations

AR1	(see subclause 4.1.3)
AR2	(see subclause 4.1.3)
dBc	dB relative to the carrier power
emf	electro-motive force
IF	Intermediate Frequency
RF	Radio Frequency
Rx	Receiver
SINAD	(signal + noise + distortion)/(noise + distortion)
Tx	Transmitter
VSWR	Voltage Standing Wave Ratio

3.3 Symbols

E ₀	Reference field strength (see annex A)
R ₀	Reference distance (see annex A)

4 General

4.1 Presentation of equipment for testing purposes

Each equipment submitted for type testing shall fulfil the requirements of this ETS on all channels over which it is intended to operate.

To simplify and harmonise the type testing procedures between the different test laboratories, measurements shall be performed, according to this ETS, on samples of equipment defined in subclauses 4.1.1 to 4.1.11.

These clauses are intended to give confidence that the requirements set out in this ETS have been met without the necessity of performing measurements on all channels.

4.1.1 Choice of model for type approval

The manufacturer shall provide one or more production model(s) of the equipment, as appropriate, for type approval testing.

If type approval is given on the basis of tests on a preliminary model, then the corresponding production models shall be identical in all respects with the preliminary model tested.

4.1.2 Definitions of alignment range and switching range

The manufacturer shall, when submitting equipment for test, state the alignment ranges for the receiver and the transmitter.

The alignment range is defined as the frequency range over which the receiver and the transmitter can be programmed and/or realigned to operate, without any physical change of components other than programmable read only memories or crystals (for the receiver and the transmitter).

The manufacturer shall also state the switching range of the receiver and the transmitter (which may differ).

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

For the purpose of all measurements, the receiver and transmitter shall be considered separately.

4.1.3 Definition of the categories of the alignment range (AR1 and AR2)

The alignment range falls into one of two categories.

The first category corresponds to a limit of the alignment range, of the receiver and the transmitter, which is less than 10 % of the highest frequency of the alignment range for equipment operating on frequencies up to 500 MHz, or less than 5 % for equipment operating above 500 MHz. This category is defined as AR1.

The second category corresponds to an alignment range of the receiver and transmitter which is greater than 10 % of the highest frequency of the alignment range for equipment on frequencies up to 500 MHz, or greater than 5 % for equipment operating above 500 MHz. This category is defined as AR2.

4.1.4 Choice of frequencies

The frequencies for testing shall be chosen by the manufacturer in consultation with the appropriate authority, in accordance with subclauses 4.1.5 to 4.1.11 and annex C. The manufacturer selects the frequencies for testing and will ensure that the chosen frequencies are within one or more of the national bands for which type approval is required.

4.1.5 Testing of single channel equipment of category AR1

In the case of single channel equipment of the category AR1, one sample of the equipment shall be tested.

Full tests shall be carried out on a channel within 100 kHz of the centre frequency of the alignment range.

4.1.6 Testing of single channel equipment of category AR2

In the case of single channel equipment of the category AR2, three samples of the equipment shall be tested. Tests shall be carried out on a total of three channels.

The frequency of the channel of the first sample shall be within 100 kHz of the highest frequency of the alignment range.

The frequency of the channel of the second sample shall be within 100 kHz of the lowest frequency of the alignment range.

The frequency of the channel of the third sample shall be within 100 kHz of the centre frequency of the alignment range.

Full tests shall be carried out on all three channels.

4.1.7 Testing of two channel equipment of category AR1

In the case of two channel equipment of category AR1, one sample of the equipment shall be tested. Tests shall be carried out on the two channels.

The frequency of the upper channel shall be within 100 kHz of the highest frequency of the switching range.

The frequency of the lower channel shall be within 100 kHz of the lowest frequency of the switching range. In addition the average of the frequencies of the two channels shall be within 100 kHz of the centre frequency of the alignment range.

Full tests shall be carried out on the upper channel and limited tests on the lower channel.

4.1.8 Testing of two channel equipment of category AR2

In the case of two channel equipment of the category AR2, three samples of the equipment shall be tested.

Tests shall be carried out on a total of four channels.

The highest frequency of the switching range of one sample shall be within 100 kHz of the centre frequency of the alignment range. The frequency of the upper channel shall be within 100 kHz of the highest frequency of the switching range and the frequency of the lower channel shall be within 100 kHz of the lowest frequency of the switching range.

Full tests shall be carried out on the upper channel and limited tests on the lower channel.

The frequency of one of the channels of the second sample shall be within 100 kHz of the highest frequency of the alignment range.

Full tests shall be carried out on this channel.

The frequency of one of the channels of the third sample shall be within 100 kHz of the lowest frequency of the alignment range.

Full tests shall be carried out on this channel.