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Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment using an integral antenna transmitting signals to initiate a specific response in the receiver

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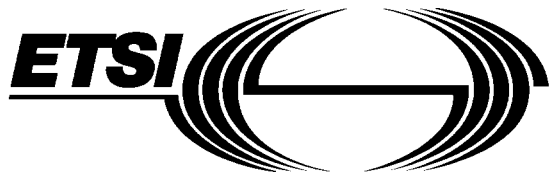
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Technical characteristics and test conditions for
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ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE

Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE

X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

Tel.: +33 92 94 42 00 - Fax: +33 93 65 47 16

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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 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 October 1995
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	30 April 1996
Date of withdrawal of any conflicting National Standard (dow):	30 April 1996

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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 this 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 non-speech and to the non-speech part of combined speech/non-speech equipment with integral antennas, used in constant envelope 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.

This ETS, which is based upon CEPT Recommendation T/R 24-01 annex VI [1], is a general standard which may be superseded by specific standards covering specific applications.

In this ETS, a non-speech radio equipment is defined as a radio equipment transmitting a signal to initiate a specific response in the receiver. The equipment comprises a transmitter and associated encoder and/or a receiver and associated decoder. The encoder and/or decoder may be a separate piece of equipment, in which case compliance to this ETS covers the combination of encoder and/or decoder and transmitter and/or receiver equipment.

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 [5] where possible.

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

This ETS is complementary to I-ETS 300 219 [2] which covers radio equipment with an internal or external RF connector transmitting signals to initiate a specific response in the receiver, for use in the land mobile service. It is primarily intended for omnidirectional applications.

For combined speech/non speech equipment this ETS is complementary to ETS 300 296 [8] which covers radio equipment using integral antennas for use in the land mobile service intended primarily for analogue speech.

Channel separations, maximum transmitter effective radiated power, the type and characteristics of modulation and the inclusion of automatic transmitter shut-off facility may be conditions required for the issue of a licence by the appropriate administration.

Equipment which also includes an external or internal RF connector should be type tested to the requirements of ETS 300 086 [3] and/or I-ETS 300 219 [2] using this connector.

In the case of combined speech/non-speech equipment the speech part should be tested to the requirements of ETS 300 296 [8] and additionally the tests described in the following subclauses of this ETS should be carried out:

- subclause 8.3: adjacent channel power;
- subclause 9.1: average usable sensitivity (responses).

These requirements also apply for equipment with an analogue output facility provided for test purposes only.

Where an equipment has already been type approved to ETS 300 296 [8], and is resubmitted for type testing to this ETS, additionally the tests described in the following subclauses of this ETS should be carried out:

- subclause 8.3: adjacent channel power;
- subclause 8.4: radiated spurious emissions;
- subclause 9.1: average usable sensitivity (responses).

Radio equipment for data is covered by I-ETS 300 113 [4] and prETS 300 390 [9].

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).

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2 Normative references

This ETS incorporates by dated or undated references, 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 VI: "Technical characteristics and test conditions for non-speech and combined speech/non-speech radio equipment (using signalling to initiate a specific response in the receiver) with integral antennas in the Land Mobile Service".
- [2] I-ETS 300 219 (1993): "Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment transmitting signals to initiate a specific response in the receiver".
- [3] ETS 300 086: "Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment with an internal or external RF connector intended primarily for analogue speech".
- [4] I-ETS 300 113 (1992): "Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for non-speech and combined analogue speech/non-speech equipment with an internal or external connector, intended for the transmission of data".
- [5] ETR 027: "Radio Equipment and Systems (RES); Methods of measurement for mobile radio equipment".
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- [6] ETR 028: "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".
<https://standards.iteh.ai/catalog/standards/sist/300-341-1998/etr-028>
- [7] CCITT Recommendation O.41: "Psophometer for use on telephone-type circuits".
- [8] ETS 300 296: "Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment using integral antennas intended primarily for analogue speech".
- [9] Draft prETS 300 390: "Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for non-speech and combined analogue speech/non-speech equipment using integral antennas, intended for the transmission of data".

3 Definitions, symbols and abbreviations

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 the resistor is 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 is agreed between the manufacturer and the testing authority and details included in the test report. If special equipment is required then it is 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 are such that, at the output, a 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 is 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 should 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 O.41 [7].

Types of measurements:

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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.

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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 9.3;
- transmitter frequency error, subclause 8.1;
- transmitter effective radiated power, subclause 8.2;
- transmitter adjacent channel power, subclause 8.3.

3.2 Symbols

For the purposes of this ETS, the following symbols apply:

E ₀	Reference field strength (see annex A)
R ₀	Reference distance (see annex A)
r.m.s	root mean square

3.3 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

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

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 subclauses 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).