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Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment intended for the transmission of data (and speech) and having an antenna connector

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33.060.99	Druga oprema za radijske komunikacije	Other equipment for radiocommunications
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**Radio Equipment and Systems (RES);
Land mobile service;
Technical characteristics and test conditions
for radio equipment intended for
the transmission of data (and speech)
and having an antenna connector**

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Contents

Foreword	9
Introduction	10
1 Scope	11
2 Normative references	12
3 Definitions, symbols and abbreviations	12
3.1 Definitions	12
3.2 Symbols	13
3.3 Abbreviations	13
4 General	14
4.1 Presentation of equipment for testing purposes	15
4.1.1 Choice of model for type testing	15
4.1.2 Definitions of alignment range and switching range	15
4.1.3 Definition of the categories of the alignment range (AR1 and AR2)	15
4.1.4 Choice of frequencies	15
4.1.5 Testing of single channel equipment of category AR1	15
4.1.6 Testing of single channel equipment of category AR2	16
4.1.7 Testing of two channel equipment of category AR1	16
4.1.8 Testing of two channel equipment of category AR2	16
4.1.9 Testing of multi-channel equipment (more than two channels) of category AR1	16
4.1.10 Testing of multi channel equipment (more than two channels) of category AR2 (switching range less than the alignment range)	17
4.1.11 Testing of multi channel equipment (more than two channels) of category AR2 (switching range equals the alignment range)	17
4.1.12 Testing of equipment without an external 50 Ω RF connector	17
4.1.12.1 Equipment with an internal permanent or temporary antenna connector	17
4.1.12.2 Equipment with a temporary antenna connector	17
4.2 Mechanical and electrical design	18
4.2.1 General	18
4.2.2 Controls	18
4.2.3 Transmitter shut-off facility	18
4.2.4 Marking	18
4.3 Testing using bit streams or messages	18
4.4 Interpretation of the measurement results	18
5 Technical characteristics	18
5.1 Transmitter parameter limits	18
5.1.1 Frequency error	18
5.1.2 Carrier power (conducted)	19
5.1.3 Effective radiated power	19
5.1.4 Adjacent channel power	20
5.1.5 Spurious emissions	20
5.1.6 Intermodulation attenuation	21
5.1.7 Transmitter attack time	21
5.1.8 Transmitter release time	21
5.1.9 Transient behaviour of the transmitter	21
5.1.9.1 Time domain analysis of power and frequency	21
5.1.9.2 Adjacent channel transient power	21
5.2 Receiver parameter limits	22
5.2.1 Maximum usable sensitivity (data or messages, conducted)	22
5.2.2 Average usable sensitivity (data or messages, field strength)	22

	5.2.3	Error behaviour at high input levels	22
	5.2.4	Co-channel rejection	22
	5.2.5	Adjacent channel selectivity	22
	5.2.6	Spurious response rejection	23
	5.2.7	Intermodulation response rejection	23
	5.2.8	Blocking or desensitisation	23
	5.2.9	Spurious radiations	23
5.3	Duplex operation - receiver limits		23
	5.3.1	Receiver desensitisation and maximum usable sensitivity (with simultaneous transmission and reception)	23
	5.3.2	Receiver spurious response rejection (with simultaneous transmission and reception)	23
6	Test conditions, power sources and ambient temperatures		24
	6.1	Normal and extreme test conditions	24
	6.2	Test power source	24
	6.3	Normal test conditions	24
	6.3.1	Normal temperature and humidity	24
	6.3.2	Normal test power source	24
		6.3.2.1 Mains voltage	24
		6.3.2.2 Regulated lead-acid battery power sources used on vehicles	24
		6.3.2.3 Other power sources	25
	6.4	Extreme test conditions	25
	6.4.1	Extreme temperatures	25
	6.4.2	Extreme test source voltages	25
		6.4.2.1 Mains voltage	25
		6.4.2.2 Regulated lead-acid battery power sources on vehicles	25
		6.4.2.3 Power sources using other types of batteries	25
		6.4.2.4 Other power sources	25
	6.5	Procedure for tests at extreme temperatures	26
	6.5.1	Procedure for equipment designed for continuous operation	26
	6.5.2	Procedure for equipment designed for intermittent operation	26
7	General conditions		26
	7.1	Arrangements for test signals applied to the receiver input	26
	7.2	Receiver mute or squelch facility	27
	7.3	Normal test signals (wanted and unwanted signals)	27
	7.4	Encoder for receiver measurements	27
	7.5	Transceiver data interface	28
	7.6	Impedance	28
	7.7	Artificial antenna	28
	7.8	Tests of equipment with a duplex filter	28
	7.9	Facilities for access	28
		7.9.1 Analogue access	28
		7.9.2 Test points for bit stream measurements	28
		7.9.3 Coupling arrangements	29
		7.9.3.1 Arrangements for measurements with continuous bit streams	29
		7.9.3.2 Arrangements for measurements with messages	29
	7.10	Test site and general arrangements for measurements involving the use of radiated fields	29
	7.11	Modes of operation of the transmitter	29
8	Methods of measurement for transmitter parameters		30
	8.1	Frequency error	30
		8.1.1 Definition	30
		8.1.2 Method of measurement	30
	8.2	Carrier power (conducted)	30
		8.2.1 Definitions	30
		8.2.2 Method of measurement	30
	8.3	Effective radiated power (field strength)	31
		8.3.1 Definition	31

	8.3.2	Method of measurement	32
8.4		Maximum permissible frequency deviation	34
	8.4.1	Definition	34
	8.4.2	Method of measurement	34
8.5		Adjacent channel power	34
	8.5.1	Definition	34
	8.5.2	Method of measurement	35
8.6		Spurious emissions	36
	8.6.1	Definition	36
	8.6.2	Method of measuring the power level	36
	8.6.3	Method of measuring the effective radiated power	37
8.7		Intermodulation attenuation	39
	8.7.1	Definition	39
	8.7.2	Method of measurement	39
8.8		Transmitter attack time	40
	8.8.1	Definition	40
	8.8.2	Method of measurement	40
8.9		Transmitter release time	40
	8.9.1	Definition	40
	8.9.2	Method of measurement	41
8.10		Transient behaviour of the transmitter	41
	8.10.1	Definitions	41
	8.10.2	Timings, frequencies and powers	43
	8.10.3	Methods of measurement	47
		8.10.3.1 Time domain measurements of power and frequency	47
		8.10.3.2 Test arrangement and characteristics of the test discriminator	48
		8.10.3.3 Adjacent channel transient power measurements	48
		8.10.3.4 Characteristics of the adjacent channel transient power measuring device	49
9		Methods of measurement for receiver parameters	50
	9.1	Maximum usable sensitivity (data or messages, conducted)	50
		9.1.1 Definition	50
		9.1.2 Method of measurement with continuous bit streams	50
		9.1.3 Method of measurement with messages	50
	9.2	Average usable sensitivity (data or messages, field strength)	51
	9.3	Level of the wanted signal for the degradation measurements (data or messages)	51
	9.4	Error behaviour at high input levels	52
		9.4.1 Definition	52
		9.4.2 Method of measurement with continuous bit streams	52
		9.4.3 Method of measurement with messages	52
	9.5	Co-channel rejection	53
		9.5.1 Definition	53
		9.5.2 Method of measurement with continuous bit streams	53
		9.5.3 Method of measurement with messages	54
	9.6	Adjacent channel selectivity	55
		9.6.1 Definition	55
		9.6.2 Method of measurement with continuous bit streams	55
		9.6.3 Method of measurement with messages	56
	9.7	Spurious response rejection	58
		9.7.1 Definition	58
		9.7.2 Introduction to the method of measurement	58
		9.7.3 Method of search over the "limited frequency range"	59
		9.7.4 Method of measurement with continuous bit streams	59
		9.7.5 Method of measurement with messages	60
	9.8	Intermodulation response rejection	61
		9.8.1 Definition	61
		9.8.2 Method of measurement with continuous bit streams	62
		9.8.3 Method of measurement with messages	63
	9.9	Blocking or desensitisation	64
		9.9.1 Definition	64
		9.9.2 Method of measurement with continuous bit streams	64

9.9.3	Method of measurement with messages.....	65
9.10	Spurious radiations.....	66
9.10.1	Definition.....	66
9.10.2	Method of measuring the power level.....	67
9.10.3	Method of measuring the effective radiated power.....	68
10	Duplex operation.....	69
10.1	Receiver desensitisation (with simultaneous transmission and reception).....	69
10.1.1	Definition.....	69
10.1.2	Desensitisation measured with continuous bit streams.....	70
10.1.2.1	Method of measurement when the equipment has a duplex filter.....	70
10.1.2.2	Method of measurement when the equipment has to operate with two antennas.....	71
10.1.3	Desensitisation measured with messages.....	72
10.1.3.1	Method of measurement when the equipment has a duplex filter.....	72
10.1.3.2	Method of measurement when the equipment has to operate with two antennas.....	73
10.2	Receiver spurious response rejection (with simultaneous transmission and reception)...	74
10.2.1	Definition.....	74
10.2.2	Method of measurement.....	74
11	Measurement uncertainty.....	75
Annex A (normative):	Radiated measurements.....	76
A.1	Test site and general arrangements for measurements involving the use of radiated fields.....	76
A.1.1	Test site.....	76
A.1.2	Test antenna.....	76
A.1.3	Substitution antenna.....	77
A.1.4	Optional additional indoor site.....	77
A.2	Guidance on the use of radiation test sites.....	78
A.2.1	Measuring distance.....	78
A.2.2	Test antenna.....	78
A.2.3	Substitution antenna.....	78
A.2.4	Artificial antenna.....	79
A.2.5	Auxiliary cables.....	79
A.2.6	Acoustic measuring arrangement.....	79
A.3	Further optional alternative indoor site using an anechoic chamber.....	79
A.3.1	Example of the construction of a shielded anechoic chamber.....	79
A.3.2	Influence of parasitic reflections in anechoic chambers.....	80
A.3.3	Calibration of the shielded anechoic chamber.....	80
Annex B (normative):	Specification for some particular measurement arrangements.....	83
B.1	Power measuring receiver specification.....	83
B.1.1	IF filter.....	83
B.1.2	Attenuation indicator.....	84
B.1.3	rms value indicator.....	84
B.1.4	Oscillator and amplifier.....	84
B.2	Spectrum analyzer specification.....	84
B.3	Integrating and power summing device.....	85
Annex C (normative):	Identification.....	86
C.1	Scope.....	86
C.2	General.....	86

C.3	Position of the identification code.....	87
C.3.1	Base stations	87
	C.3.1.1 System without windows	87
	C.3.1.2 Systems with windows.....	87
C.3.2	Mobile stations	87
C.4	Bit rates and modulations.....	87
C.5	Format of the identification	89
C.6	Synchronisation.....	89
C.7	Code and block length.....	89
C.8	Contents of the identification block	90
C.8.1	Header	90
C.8.2	Country/regional code.....	90
C.8.3	National Information.....	91
	C.8.3.1 Field description	92
	C.8.3.2 Field size options.....	92
	C.8.3.3 Options for the organisation of the fields.....	92
	C.8.3.4 Examples of user/system information usage	93
C.9	Combinations	93
C.9.1	List of possible combinations.....	93
C.9.2	Relations between country/regional code and allowed combinations.....	93
C.9.3	Interpretation of the fields of the ID block	94
Annex D (informative):	Graphic representation of the selection of equipment and frequencies for testing	96
Annex E (informative):	Information on modulation, coding and format.....	98
Annex F (informative):	Bibliography.....	99
History.....		100

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[SIST ETS 300 113:1998](#)

[Bibliography](#)
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Foreword

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

This ETS is based upon CEPT Recommendation T/R 24-01 [1] and I-ETS 300 113 [6], and is complementary to ETS 300 086 [2], which covers radio equipment for use in the land mobile service and intended primarily for analogue speech.

This is a general ETS which may be superseded or complemented by specific standards addressing specific applications. It applies to equipment designed to operate within the professional mobile radio service and to the associated frequency planning.

Access protocols for equipment covered by this ETS are the subject of other ETSI standards such as ETS 300 471 [8].

This ETS is voluntary in application, however, it can be made mandatory by national Administrations as a part of the conditions attached to the issue of licenses for the use or sale of radio apparatus.

Annex A: is normative and provides additional information concerning radiated measurements.

Annex B: is normative and gives the requirements for equipment to be used for the measurements of adjacent channel power.

Annex C: is normative and presents the technical characteristics to be fulfilled, when required by the appropriate national regulatory authority, for the identification of stations type approved for professional mobile radio systems, that do not comply with other system protocols (e.g. trunking protocols); it is the responsibility of the manufacturer to ensure that the modulation that he has chosen for the identification, in accordance with the tables of this annex fulfils the requirements corresponding to the channels where the equipment is designed to operate, as specified in the main body of this ETS. The tables of this annex are expected to be updated regularly in order to reflect the progress accomplished in the field of mobile data transmissions.

Annex D: is informative and gives a graphic representation of subclauses 4.1.5 to 4.1.11, referring to the presentation of equipment for testing purpose.

Annex E: is informative and provides guidance concerning the technical characteristics of the modulation, coding and format.

Annex F is informative and contains a Bibliography.

Transposition dates	
Date of adoption of this ETS:	10 May 1996
Date of latest announcement of this ETS (doa):	31 August 1996
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	29 February 1997
Date of withdrawal of any conflicting National Standard (dow):	29 February 1997

Introduction

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 given in subclause 4.4.

This ETS 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 of 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 in clause 4, methods of measurement in clauses 8, 9 and 10, and conditions in clauses 6 and 7.

This ETS may also be used by monitoring services in particular for the identification of stations (see annex C).

This ETS was drafted on the assumption that:

- type test measurements performed in an accredited testing laboratory in one country would be accepted by the Administration in another country provided that the national regulatory requirements are met (in accordance to CEPT Recommendation T/R 71-03 [7]);
- if equipment available on the market is required to be checked it should be tested in accordance with the methods specified in this ETS.

All transmissions from equipment conforming to this ETS should include at specified moments, information establishing the identity of the transmitter.

The means of system identification should be approved by the appropriate national regulatory authority.

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1 Scope

This European Telecommunication Standard (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.

This ETS applies to constant envelope angle modulation systems for use in the land mobile service, using the available bandwidth, operating on radio frequencies between 30 MHz and 1 GHz, with channel separations of 12,5 kHz, 20 kHz and 25 kHz intended for data transmissions. It applies to digital and combined analogue and digital radio equipment with an internal or external antenna connector intended for the transmission of data and/or speech.

The particular type of modulation will be chosen by the manufacturer, although it is recognised that in some countries national legislation may limit the use of certain code structures/data formats.

The technical characteristics given in this ETS are independent of data rate but may in practice limit the maximum data rate achievable. Future editions of this ETS are being prepared to allow complex modulation methods, together with their appropriate limits, for use at higher bit rates.

In this ETS different requirements are given for the different radio frequency bands, channel separations, etc. where appropriate.

In this ETS, data transmission systems are defined as systems which transmit and/or receive data. The equipment comprises a transmitter and associated encoder and modulator and/or a receiver and associated demodulator and decoder.

The types of equipment covered by this ETS are as follows:

- base station (equipment fitted with an antenna socket, intended for use in a fixed location);
- mobile station (equipment fitted with an antenna socket, normally used in a vehicle or as a transportable);
- and those handportable stations:
 - a) fitted with an antenna socket; or
 - b) without an external antenna socket (integral antenna equipment), but fitted with a permanent internal or a temporary internal 50 Ω Radio Frequency (RF) connector which allows access to the transmitter output and the receiver input.

Handportable equipment without an external or internal RF connector and without the possibility of having a temporary internal 50 Ω RF connector is not covered by this ETS.

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

Channel separations, maximum transmitter output power/effective radiated power, class of transmitter intermodulation attenuation, bit rates and the use of digitised speech may be conditions to the issue of a licence by the appropriate Administration.

Requirements to be fulfilled by equipment designed to meet several ETSs can be found in clause 4.

2 Normative references

This ETS 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 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: "Specifications of equipments for use in the Land Mobile Service".
- [2] ETS 300 086: "Radio Equipment and Systems (RES); Land mobile group; Technical characteristics and test conditions for radio equipment with an internal or external RF connector intended primarily for analogue speech".
- [3] ETS 300 390 (1996): "Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment intended for the transmission of data (and speech) and using an integral antenna".
- [4] ETR 028 (1994): "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".
- [5] ITU-T Recommendation O.153: "Basic parameters for the measurement of error performance at bit rates below the primary rate".
- [6] 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 antenna connector intended for the transmission of data".
- [7] CEPT Recommendation T/R 71-03: "Procedures for type testing and approval for radio equipment intended for non-public systems".
<https://standards.iteh.ai/catalog/standards/sist/680f0aa8-15ec-458c-86dd-5877af146/sist-ets-300-113-1998>
- [8] ETS 300 471: "Radio Equipment and Systems (RES); Land mobile service; Access protocol, occupation rules and corresponding technical characteristics of radio equipment for the transmission of data on shared channels".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions apply.

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

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.

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

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.

angle modulation: Either phase modulation or frequency modulation.

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

limited tests: As required by subclause 4.1, the limited tests are:

- transmitter frequency error, subclause 8.1;
- transmitter carrier power (conducted), subclause 8.2;
- transmitter effective radiated power, subclause 8.3, integral antenna equipment only;
- transmitter adjacent channel power, subclause 8.5;
- receiver maximum usable sensitivity (conducted): subclause 9.1;
- receiver average usable sensitivity (field strength), subclause 9.2, integral antenna equipment only;
- receiver adjacent channel selectivity, subclause 9.6.

conducted measurements: Measurements which are made using direct 50 Ω connection to the equipment under test.

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

bit: Binary digit.

block: The smallest quantity of information that is sent over the radio channel. A constant number of useful bits are always sent together with the corresponding redundancy bits.

packet: One block or a contiguous stream of blocks sent by one (logical) transmitter to one particular receiver or one particular group of receivers.

transmission (physical): One or several packets transmitted between power on and power off of a particular transmitter.

window: A set of inter-related transmissions which may be limited in time by an appropriate access protocol and corresponding occupation rules.

session: A set of inter-related exchange of packets occupying one or several windows or part thereof (if applicable). It corresponds to a complete interactive procedure for interchanging data between users, comprising initiation, data transmission and termination procedures. The session can be short (e.g. 2 packets), or long (e.g. one full page of text).

message: User data to be transferred in one or more packets in a session.

3.2 Symbols

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

E _o	Reference field strength
R _o	Reference distance
dB _d	Antenna gain relative to $\lambda/2$ dipole (subclause A.1.3)
dB _i	Antenna gain relative to an isotropic radiator (subclause A.1.3)
D-M ₀ , D-M ₁ ...	names of signals defined in subclause 7.3

The symbols used in the clauses relating to transients and timings can be found in subclause 8.10.1.

3.3 Abbreviations

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

BS	Base Station
CRC	Cyclic Redundancy Code
dB _c	decibels relative to the carrier power
emf	electromotive force
erp	effective radiated power
FEC	Forward Error Correction
FFSK	Fast Frequency Shift Keying
FSK	Frequency Shift Keying
GMSK	Gaussian Minimum Shift Keying
IF	Intermediate Frequency
LSB	Least Significant Bit
MSB	Most Significant Bit