



SLOVENSKI STANDARD SIST I-ETS 300 219:1999

01-oktober-1999

F U X] ' g _ U c d f Y a U] b ' g] g h Y a] ' f F 9 G L ! ' G r c f] h Y j ' _ c d Y b g _] \ ' a c V] b] \ ' _ c a i b] _ U W ^ !
H Y \ b] b Y _ U f U _ h f] g h _ Y] b ' d f Y g _ i y U b] ' d c [c ^] ' n U f U X] ' g _ c ' c d f Y a c ž _] ' c X X U U g] [b U Y
n U j n V i X] h Y j ' g d Y W Z b Y [U c X n] j U j ' g d f Y ^ Y a b] _ i

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

ITeH STANDARD PREVIEW (standards.iteh.ai)

[SIST I-ETS 300 219:1999](https://standards.iteh.ai/catalog/standards/sist/e7a9aca6-c2a7-46b5-b131-74b2f3df5720/sist-i-ets-300-219-1999)

<https://standards.iteh.ai/catalog/standards/sist/e7a9aca6-c2a7-46b5-b131-74b2f3df5720/sist-i-ets-300-219-1999>

Ta slovenski standard je istoveten z: **I-ETS 300 219 Edition 1**

ICS:

| | | |
|-----------|-----------------------------|--------------------------------------|
| 33.060.20 | Sprejemna in oddajna oprema | Receiving and transmitting equipment |
|-----------|-----------------------------|--------------------------------------|

SIST I-ETS 300 219:1999

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST I-ETS 300 219:1999

<https://standards.iteh.ai/catalog/standards/sist/e7a9aca6-c2a7-46b5-b131-74b2f3df5720/sist-i-ets-300-219-1999>



I
E
T
S

**INTERIM
EUROPEAN
TELECOMMUNICATION
STANDARD**

I-ETS 300 219

October 1993

Source: ETSI TC-RES

Reference: DI/RES-02-02

ICS: 33.060, 33.060.20

Key words: Land mobile radio, responses, testing

**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**

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

Copyright Notification: No part may be reproduced except as authorized by written permission. The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 1993. All rights reserved.

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST I-ETS 300 219:1999

<https://standards.iteh.ai/catalog/standards/sist/e7a9aca6-c2a7-46b5-b131-74b2f3df5720/sist-i-ets-300-219-1999>

Contents

| | |
|--|----|
| Foreword | 7 |
| Introduction | 7 |
| 1 Scope | 9 |
| 2 Normative references | 10 |
| 3 Definitions..... | 10 |
| 4 Symbols and abbreviations..... | 11 |
| 5 General..... | 11 |
| 5.1 Presentation of equipment for testing purposes | 11 |
| 5.1.1 Choice of model for type testing | 11 |
| 5.1.2 Definitions of alignment range and switching range..... | 12 |
| 5.1.3 Definition of the categories of the alignment range (AR1 and AR2)..... | 12 |
| 5.1.4 Choice of frequencies | 12 |
| 5.1.5 Testing of single channel equipment of category AR1..... | 12 |
| 5.1.6 Testing of single channel equipment of category AR2..... | 12 |
| 5.1.7 Testing of two channel equipment of category AR1..... | 13 |
| 5.1.8 Testing of two channel equipment of category AR2..... | 13 |
| 5.1.9 Testing of multi channel equipment (more than two channels) of category AR1 | 13 |
| 5.1.10 Testing of multi channel equipment (more than two channels) of category AR2 (switching range less than alignment range) | 13 |
| 5.1.11 Testing of multi channel equipment (more than two channels) of category AR2 (switching range equals the alignment range) | 14 |
| 5.1.12 Testing of equipment without an external 50 Ω RF connector..... | 14 |
| 5.1.12.1 Equipment with an internal permanent or temporary antenna connector | 14 |
| 5.1.12.2 Equipment with a temporary antenna connector | 14 |
| 5.2 Mechanical and electrical design | 15 |
| 5.2.1 General | 15 |
| 5.2.2 Controls..... | 15 |
| 5.2.3 Transmitter shut-off facility (time-out)..... | 15 |
| 5.2.4 Labelling..... | 15 |
| 5.3 Interpretation of the measurement results | 15 |
| 6 Technical characteristics..... | 15 |
| 6.1 Transmitter parameter limits | 15 |
| 6.1.1 Frequency error | 15 |
| 6.1.2 Carrier power (conducted) | 16 |
| 6.1.3 Effective radiated power..... | 16 |
| 6.1.4 Adjacent channel power | 17 |
| 6.1.5 Spurious emissions..... | 17 |
| 6.1.6 Intermodulation attenuation | 17 |
| 6.1.7 Transient frequency behaviour of the transmitter..... | 18 |
| 6.2 Receiver parameter limits | 18 |
| 6.2.1 Reference sensitivity (response)..... | 18 |
| 6.2.2 Maximum usable sensitivity (response, conducted)..... | 18 |
| 6.2.3 Maximum usable sensitivity (response, field strength)..... | 18 |
| 6.2.4 Co-channel rejection | 19 |
| 6.2.5 Adjacent channel selectivity..... | 19 |

| | | | |
|-----|-------|---|----|
| | 6.2.6 | Spurious response rejection | 19 |
| | 6.2.7 | Intermodulation response rejection..... | 19 |
| | 6.2.8 | Blocking or desensitisation | 19 |
| | 6.2.9 | Spurious radiations | 20 |
| 6.3 | | Duplex operation - receiver limits | 20 |
| | 6.3.1 | Receiver desensitisation and maximum usable sensitivity (with simultaneous transmission and reception)..... | 20 |
| | 6.3.2 | Receiver spurious response rejection | 20 |
| 7 | | Test conditions, power sources and ambient temperatures..... | 20 |
| | 7.1 | Normal and extreme test conditions | 20 |
| | 7.2 | Test power source | 20 |
| | 7.3 | Normal test conditions | 21 |
| | 7.3.1 | Normal temperature and humidity..... | 21 |
| | 7.3.2 | Normal test power source | 21 |
| | | 7.3.2.1 Mains voltage | 21 |
| | | 7.3.2.2 Regulated lead-acid battery power sources used on vehicles..... | 21 |
| | | 7.3.2.3 Other power sources | 21 |
| | 7.4 | Extreme test conditions..... | 21 |
| | 7.4.1 | Extreme temperatures | 21 |
| | 7.4.2 | Extreme test source voltages | 22 |
| | | 7.4.2.1 Mains voltage | 22 |
| | | 7.4.2.2 Regulated lead-acid battery power sources used on vehicles..... | 22 |
| | | 7.4.2.3 Power sources using other types of batteries..... | 22 |
| | | 7.4.2.4 Other power sources | 22 |
| | | 7.4.2.5 Variety of power sources | 22 |
| | 7.5 | Procedure for tests at extreme temperatures | 22 |
| | 7.5.1 | Procedure for equipment designed for continuous operation..... | 23 |
| | 7.5.2 | Procedure for equipment designed for intermittent operation..... | 23 |
| 8 | | General conditions..... | 23 |
| | 8.1 | Normal test signals, test conditions and the unwanted test signals..... | 23 |
| | 8.2 | Artificial antenna..... | 24 |
| | 8.3 | Test sites and general arrangements for radiated measurements..... | 24 |
| | 8.4 | Transmitter automatic shut-off facility (Time-out)..... | 24 |
| | 8.5 | Modes of operation of the transmitter | 24 |
| | 8.6 | Arrangements for test signals at the input of the receiver..... | 24 |
| | 8.7 | Receiver mute or squelch facility..... | 24 |
| | 8.8 | Encoder for receiver measurements | 24 |
| | 8.9 | Facilities for access between the receiver demodulator output and its decoder | 25 |
| | 8.10 | Calling indicator..... | 25 |
| | 8.11 | Reset..... | 25 |
| | 8.12 | Reset time..... | 25 |
| | 8.13 | Test of equipment with a duplex filter | 25 |
| 9 | | Methods of measurement for transmitter parameters | 25 |
| | 9.1 | Frequency error | 25 |
| | | 9.1.1 Definition..... | 25 |
| | | 9.1.2 Method of measurement | 25 |
| | 9.2 | Carrier power (conducted) | 26 |
| | | 9.2.1 Definitions | 26 |
| | | 9.2.2 Method of measurement | 26 |
| | 9.3 | Effective radiated power (field strength)..... | 26 |
| | | 9.3.1 Definition..... | 26 |
| | | 9.3.2 Method of measurement | 26 |
| | 9.4 | Adjacent channel power | 27 |
| | | 9.4.1 Definition..... | 27 |
| | | 9.4.2 Methods of measurement..... | 28 |

| | | |
|--------|---|----|
| 9.5 | Spurious emissions..... | 28 |
| 9.5.1 | Definition | 29 |
| 9.5.2 | Method of measuring the power level in a specified load, subclause 9.5.1, paragraph a)..... | 29 |
| 9.5.3 | Method of measuring the effective radiated power, subclause 9.5.1, paragraph b)..... | 29 |
| 9.5.4 | Method of measuring the effective radiated power, subclause 9.5.1, paragraph c)..... | 30 |
| 9.6 | Intermodulation attenuation | 31 |
| 9.6.1 | Definition | 31 |
| 9.6.2 | Method of measurement | 31 |
| 9.7 | Transient frequency behaviour of the transmitter..... | 32 |
| 9.7.1 | Definitions..... | 32 |
| 9.7.2 | Method of measurement | 32 |
| 10 | Methods of measurement for receiver parameters..... | 35 |
| 10.1 | Reference sensitivity (response)..... | 35 |
| 10.1.1 | Definition | 35 |
| 10.2 | Maximum usable sensitivity (responses, conducted)..... | 35 |
| 10.2.1 | Definition | 35 |
| 10.2.2 | Method of measurement ("up-down method") | 35 |
| 10.3 | Maximum usable sensitivity (responses, field strength)..... | 36 |
| 10.3.1 | Definition | 36 |
| 10.3.2 | Test conditions..... | 36 |
| 10.3.3 | Method of measurement | 36 |
| 10.4 | Co-channel rejection..... | 37 |
| 10.4.1 | Definition | 37 |
| 10.4.2 | Method of measurement | 37 |
| 10.5 | Adjacent channel selectivity..... | 38 |
| 10.5.1 | Definition | 38 |
| 10.5.2 | Method of measurement..... | 38 |
| 10.6 | Spurious response rejection..... | 39 |
| 10.6.1 | Definition | 39 |
| 10.6.2 | Introduction to the method of measurement..... | 39 |
| | 10.6.2.1 Method of search over the "limited frequency range" | 40 |
| | 10.6.2.2 Method of measurement | 40 |
| 10.7 | Intermodulation response..... | 41 |
| 10.7.1 | Definition | 41 |
| 10.7.2 | Method of measurement | 41 |
| 10.8 | Blocking or desensitisation | 42 |
| 10.8.1 | Definition | 42 |
| 10.8.2 | Method of measurement | 42 |
| 10.9 | Spurious radiations..... | 43 |
| 10.9.1 | Definition | 43 |
| 10.9.2 | Method of measuring the power level in a specified load, subclause 10.9.1, paragraph a) | 43 |
| 10.9.3 | Method of measuring the effective radiated power, subclause 10.9.1, paragraph b)..... | 44 |
| 10.9.4 | Method of measuring the effective radiated power, subclause 10.9.1, paragraph c)..... | 45 |
| 11 | Duplex operation | 45 |
| 11.1 | Receiver desensitisation with simultaneous transmission and reception..... | 45 |
| 11.1.1 | Definition | 45 |
| 11.1.2 | Method of measurement when the equipment operates with a duplex filter.. | 45 |
| 11.1.3 | Measuring method when the equipment operates with separate Tx and Rx antennas..... | 45 |
| 11.2 | Receiver spurious response rejection..... | 46 |
| 11.2.1 | Definition | 46 |
| 11.2.2 | Method of measurement | 46 |

| | | |
|--|--|----|
| 12 | Measurement uncertainty | 47 |
| Annex A (normative): Radiated measurements | | 48 |
| A.1 | Test sites and general arrangements for measurements involving the use of radiated fields..... | 48 |
| A.1.1 | Outdoor test site | 48 |
| A.1.2 | Test antenna..... | 48 |
| A.1.3 | Substitution antenna | 49 |
| A.1.4 | Optional additional indoor site..... | 49 |
| A.2 | Guidance on the use of radiation test sites | 50 |
| A.2.1 | Measuring distance | 50 |
| A.2.2 | Test antenna..... | 50 |
| A.2.3 | Substitution antenna | 50 |
| A.2.4 | Artificial antenna..... | 51 |
| A.2.5 | Auxiliary cables | 51 |
| A.2.6 | Acoustic measuring arrangement..... | 51 |
| A.2.7 | Identification of radiated components..... | 51 |
| A.3 | Further optional alternative indoor test site using an anechoic chamber..... | 51 |
| A.3.1 | Example of the construction of a shielded anechoic chamber | 52 |
| A.3.2 | Influence of parasitic reflections in anechoic chambers | 52 |
| A.3.3 | Calibration of the shielded anechoic chamber | 52 |
| Annex B (normative): Specifications for adjacent channel power measurement arrangements | | 55 |
| B.1 | Power measuring receiver specification..... | 55 |
| B.2 | Technical characteristics | 55 |
| B.2.1 | IF filter | 55 |
| B.2.2 | Variable attenuator..... | 56 |
| B.2.3 | rms value indicator | 56 |
| B.2.4 | Oscillator and amplifier | 56 |
| Annex C (normative): Graphic representation of the selection of equipment and frequencies for testing of single and multi-channel equipment..... | | 57 |
| History | | 59 |

ITIH STANDARD PREVIEW

(standards.iteh.ai)

SIST I-ETS 300 219:1999

<https://standards.iteh.ai/catalog/standards/sist/e7a9aca6-c2a7-46b5-b131-74b213d15720/sist-i-ets-300-219-1999>

Foreword

This Interim European Telecommunication Standard (I-ETS) has been prepared by the Radio Equipment and Systems (RES) Technical Committee, and having passed through the Voting phase of the ETSI standards approval procedure, is now published.

This I-ETS is based upon CEPT Recommendation T/R 24-01 Annex V [1].

For combined speech/non-speech equipment this I-ETS is complementary to ETS 300 086 [2], which covers radio equipment for use in the land mobile service intended primarily for analogue speech. Limits stated in this I-ETS are in line with ETS 300 086 [2]. However it is anticipated that figures for limits for receiver sensitivity (field strength) will be revised.

Angle modulation with constant envelope should be used for radio equipment covered by this I-ETS.

Channel separations, temperature range, maximum transmitter output power/effective radiated power and the type and characteristics of modulation, class of transmitter intermodulation attenuation and the inclusion of automatic transmitter shut-off facility may be conditions required for the issue of a licence by the appropriate regulatory authority.

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

It should be noted that radio equipment for data is covered by I-ETS 300 113 [3].

This I-ETS does not cover requirements for radiated emissions below 30 MHz. It is anticipated that methods of measurements and minimum standards for such emissions will be covered by specifications supporting EMC Directive 89/336 EEC.

Annex A contains normative specifications and 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 5.1, referring to the presentation of equipment for testing purposes.

The means of system identification for non-speech equipment, or the non-speech part of combined speech/non-speech equipment, should be approved by the appropriate national regulatory authority.

Introduction

This I-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 6 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 5.3.

This I-ETS will 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 shall be representative for the performance of the corresponding production model. In order to avoid any ambiguity in that assessment, this I-ETS contains instructions for the presentation of equipment for type testing purposes (Clause 5), conditions (Clauses 7 and 8) and measurement methods (Clauses 9 and 10).

This I-ETS was drafted on the assumption that:

- the type test measurements will be performed only once, in one of the accredited test laboratories, 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 should be tested in accordance with the methods of measurement specified in this I-ETS.

This I-ETS covers base stations, mobile stations and two categories of handportable stations. One category is fitted with a 50 Ω external antenna socket or connector. The other category has no external antenna socket, but either:

- it is fitted with a permanent internal 50 Ω RF connector; or
- it can be fitted with a temporary internal 50 Ω RF connector, so that conducted measurements can be performed.

The means to access and/or implement the internal connector should be provided by the manufacturer.

Details of the means used during type testing should be recorded by the accredited test laboratory in the test report (see subclause 5.1.12).

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST I-ETS 300 219:1999](https://standards.iteh.ai/catalog/standards/sist/e7a9aca6-c2a7-46b5-b131-74b2f3df5720/sist-i-ets-300-219-1999)

<https://standards.iteh.ai/catalog/standards/sist/e7a9aca6-c2a7-46b5-b131-74b2f3df5720/sist-i-ets-300-219-1999>

1 Scope

This I-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 constant envelope angle modulated equipment for use 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.

In this I-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 shall comprise of 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 I-ETS covers the encoder and/or decoder in connection with the transmitter and/or receiver equipment.

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

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

- Base station: equipment fitted with an antenna socket;
- Mobile station: equipment fitted with an antenna socket;
- 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 RF connector which allows access to the transmitter output and the receiver input.

For the type of equipment defined in b), the additional measurements which shall be made using the equipment antenna connected to the station (and not using any connector) are as follows:

- subclause 9.3: Transmitter effective radiated power;
- subclause 9.5.4: Transmitter radiated spurious emissions;
- subclause 10.3: Receiver maximum usable sensitivity (response, field strength);
- subclause 10.9.4: Receiver radiated spurious radiations.

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 I-ETS.

In the case of combined speech/non-speech equipment the speech part shall be tested to ETS 300 086 [2] and additionally the tests described in the following subclauses of this I-ETS shall be carried out:

- subclause 9.4: Adjacent channel power;
- subclause 10.2: Maximum usable sensitivity (responses, conducted);
- subclause 10.3: Maximum usable sensitivity (responses, field strength).

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 300 086 [2], and is resubmitted for type testing to this I-ETS, additionally the tests described in the following subclauses of this I-ETS shall be carried out:

- subclause 9.4: Adjacent channel power;

- subclause 10.2: Maximum usable sensitivity (responses, conducted);
- subclause 10.3: Maximum usable sensitivity (responses, field strength);
- subclause 9.5: Spurious emissions.

2 Normative references

This I-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 listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this I-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-O1 Annex V: "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) in the land mobile service".
- [2] ETS 300 086: "Radio Equipment and Systems; Land mobile group; Technical characteristics and test conditions for radio equipment with an internal or external RF connector intended primarily for analogue speech".
- [3] I-ETS 300 113: "Radio Equipment and Systems; 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".
- [4] ETR 028: "Radio Equipment and Systems; Uncertainties in the measurement of mobile radio equipment characteristics".

3 Definitions

For the purposes of this I-ETS, the following definitions apply:

Angle modulation: either phase modulation or frequency modulation.

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

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

Full tests: in all cases except where qualified as "limited", tests shall be performed according to this I-ETS.

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.

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.

Limited tests: the limited tests, referred to in subclauses 5.1 to 5.1.10, are as follows:

- Transmitter frequency error, subclause 9.1;
- Transmitter carrier power (conducted), subclause 9.2;
- Transmitter effective radiated power, subclause 9.3, integral antenna equipment only;

- Transmitter adjacent channel power, subclause 9.4;
- Receiver maximum usable sensitivity (responses, conducted), subclause 10.2;
- Receiver maximum usable sensitivity (responses, field strength), subclause 10.3, integral antenna equipment only;
- Receiver adjacent channel selectivity, subclause 10.5.

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.

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

4 Symbols and abbreviations

The following symbols and abbreviations are used within this I-ETS.

| | |
|----------------|--|
| AR1 | (see subclause 5.1.3) |
| AR2 | (see subclause 5.1.3) |
| emf | electro-motive force |
| E _o | Reference field strength (see Annex A) |
| IF | Intermediate Frequency |
| RF | Radio Frequency |
| R _o | Reference distance (see Annex A) |
| R _x | Receiver |
| T _x | Transmitter |

5 General

5.1 Presentation of equipment for testing purposes

Each equipment submitted for type testing shall fulfil the requirements of this I-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 I-ETS, on samples of equipment defined in subclauses 5.1.1 to 5.1.12.

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

5.1.1 Choice of model for type testing

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 must be identical in all respects with the preliminary model tested.

In the case of handportable equipment without a 50 Ω external antenna connector, see subclause 5.1.12.

5.1.2 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.

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

The alignment range falls into one of two categories.

- a) 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.
- b) 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.

5.1.4 Choice of frequencies

The frequencies for testing shall be chosen by the manufacturer in consultation with the appropriate authority, in accordance with subclauses 5.1.5 to 5.1.11 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.

5.1.5 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.

5.1.6 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.

5.1.7 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 (see Clause 3) on the lower channel.

5.1.8 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 (see Clause 3) 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.

5.1.9 Testing of multi channel equipment (more than two channels) of category AR1

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

The centre frequency of the switching range of the sample shall correspond to the centre frequency of the alignment range.

Full tests shall be carried out on a frequency within 100 kHz of the centre frequency of the switching range. Limited tests (see Clause 3) shall be carried out within 100 kHz of the lowest and also within 100 kHz of the highest frequency of the switching range.

5.1.10 Testing of multi channel equipment (more than two channels) of category AR2 (switching range less than alignment range)

In the case of multi channel equipment of the category AR2, with switching range less than the alignment range three samples of the equipment shall be tested. Tests shall be carried out on a total of five channels.