SLOVENSKI STANDARD
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Satelitske zemeljske postaje in sistemi (SES) ï Preskusne metode za televizijske sprejemne satelitske zemeljske postaje (TVRO), ki delujejo v frekvenļ nih pasovih 11/12 GHz

Satellite Earth Stations and Systems (SES); Test methods for Television Receive Only (TVRO) operating in the 11/12 GHz frequency bands

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New presentation - see History box

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Satellite Earth Stations and Systems (SES) Technical Committee of the European Telecommunications Standards Institute (ETSI).

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1 Scope

This European Telecommunication Standard (ETS) covers the test methods for TeleVision Receive Only (TVRO) outdoor units used for reception of audio-visual signals from satellites within the 11/12 GHz frequency bands. These TVROs are defined and their characteristics are specified in the reference ETSs, ETS 300 158 [1] or ETS 300 249 [2]. This ETS specifies the test methods for demonstration of compliance with the specifications of the reference ETS, and also with those for which the reference ETS allows verification at the manufacturers' discretion.

The TVROs are classified into two different types according to the corresponding services:

- Type A for collective reception;

- Type B for individual reception.

2 Normative references

This European Telecommunication Standard (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] ETS 300 158: "Satellite Earth Stations (SES); Television Receive Only (TVRO-FSS) Satellite Earth Stations operating in the 11/12 GHz FSS bands".

[2] ETS 300 249: "Satellite Earth Stations (SES); "Television Receive-Only (TVRO) equipment used in the Broadcasting Satellite Service (BSS)".

[3] IEC 510-1 (1975): "Methods of measurement for radio equipment used in satellite earth stations; Part 1: General".

[4] IEC 1079-2 (1992): "Methods of measurement on receivers for satellite broadcast transmissions in the 12 GHz band; Part 1: Electrical measurements on DBS tuner units".

[5] CISPR 16-1 (1993): "Specification for radio disturbance and immunity measuring apparatus and methods: Part 1: Radio disturbance and immunity measuring apparatus".

[6] ETS 300 019: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment".

[7] HD 444.2 (1983): "Fire hazard testing: Part 2: Test methods".

[8] EN 60950 (1992): "Safety of information technology equipment including electrical business equipment".

[9] EN 50083-1 (1993): "Cabled distribution systems for television and sound signals. Part 1: Safety requirements".

[10] EN 50081-1 (1991): "Electromagnetic compatibility - Generic emission standard. Part 1: residential, commercial and light industry".

[11] EN 50082-1 (1991): "Electromagnetic compatibility - Generic immunity standard. Part 1: residential, commercial and light industry".

[12] EN 50140: "Electromagnetic compatibility - Basic immunity standard - Radiated, radio-frequency electromagnetic field - Immunity test".

[13] EN 50141: "Electromagnetic compatibility - Basic immunity standard - Conducted disturbances induced by radio-frequency fields - Immunity test".

[14] EN 55020 (1994): "Electromagnetic immunity of broadcast receivers and associated equipment".

[15] EN 55022 (1994): "Limits and methods of measurement of radio interference characteristics of information technology equipment".

3 Definitions and abbreviations

3.1 Definitions

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

open air: Transparent to electromagnetic waves at the frequencies under consideration. Any covering or environmental protection used must therefore also be transparent to electromagnetic waves at the frequencies under consideration.

outdoor unit: That part of the TVRO installed in a position within line of sight to the satellite(s) to be received. This normally comprises the antenna, LNB(s) and the LNB mounting.

Type A equipment: For collective reception, in particular:

Community Antenna TeleVision (CATV) equipment;
Master Antenna TeleVision (MATV) equipment.

Type B equipment: For individual reception, that is:

Direct To Home (DTH) equipment.

Other definitions are generally included in the subclause in which they occur. The definitions have been taken, where possible, from "International Electrotechnical Vocabulary (2nd Edition), Group 60, Radiocommunications" published by the International Electrotechnical Commission. Other sources include, but are not limited to, documentation produced by IEC, ETSI and CISPR.

3.2 Abbreviations

For the purposes of this ETS the following abbreviations apply:

ac	alternating current
BSS	Broadcast Satellite Service
CATV	Community Antenna TeleVision
MATV	Master Antenna TeleVision
DBS	Direct Broadcast by Satellite
dc	direct current
EIRP	Equivalent Isotropically Radiated Power
emf	electro-motive force
EUT	Equipment Under Test
FSS	Fixed Satellite Service
IF	Intermediate Frequency
LNB	Low Noise Block downconverter
LO	Local Oscillator
RF	Radio Frequency
TEM	Transverse ElectroMagnetic
VSWR	Voltage Standing Wave Ratio

4 General test arrangements

4.1 General

Seven possible test sites are described in this clause: outdoor far-field test sites, anechoic chambers, reverberating chambers, open area test sites, compact antenna test ranges, semi-anechoic chamber and a TEM cell. The test sites used for the measurements shall be validated and, where appropriate, calibrated, so as to reduce measurement uncertainty and the probability of measurement error. Other test sites may be used provided that they are proven to produce results consistent with those produced by the appropriate test site described in this clause.

Any measurement involving either antenna gain patterns or polarisation measurements shall be performed in the far field obtainable on an outdoor far-field test site, through a compact antenna test range or any other recognised method that can be proved to give the same results over the concerned frequency range.

An open air test site shall be on a reasonable level surface or ground and it shall be free from reflecting objects so that the measurement results are not unduly affected. Sufficient precautions shall be taken to ensure that reflections from objects adjacent to the test site do not degrade the measurement methods.

The ambient noise of the test site shall be at least 6 dB lower than the lowest limit to which the measurements need to be compared. All test cables shall be as short as possible and shall be adequately screened.

In the case where the outdoor unit is manufactured without an accessible interface between the antenna sub-system and the LNB, it is impossible to carry out the tests to verify compliance with the specifications. In this case the manufacturer shall provide suitable fixtures.

4.2 Outdoor far-field test site

4.2.1 General

This test site shall be such that any covering or environmental protection as well as the site itself shall be transparent to electromagnetic waves at the frequencies under consideration. The distance between the measuring and measured antennas shall be such that they are each in the far-field region of the other antenna. Reflections from both natural and artificial objects shall be at a minimum and of known amplitude and effect.

4.2.2 Description

The far-field distance of an antenna is defined as:

$$R \geq 2D^2 / \lambda$$

where:

R is the distance;
D is the largest dimension of the antenna under test;
λ is the free space wavelength at the test frequency.

Even at this minimum distance, the path difference between the ray from the source to the centre of the aperture and the ray from the source to the edge of the aperture is $\lambda/16$ and the resulting phase deviation of the incident wave-front is 22,5° which corresponds to an error of about 0,1 dB in antenna gain.

The structure supporting the EUT shall have means of adjustment in polarisation, elevation angle and azimuth angle so that the received signal can be maximised.

If the near-field scanner technology to convert near-field measurements to far-field results is proven to be accurate by reference to tests taken in both regions, then antenna measurements may be taken in the near-field.

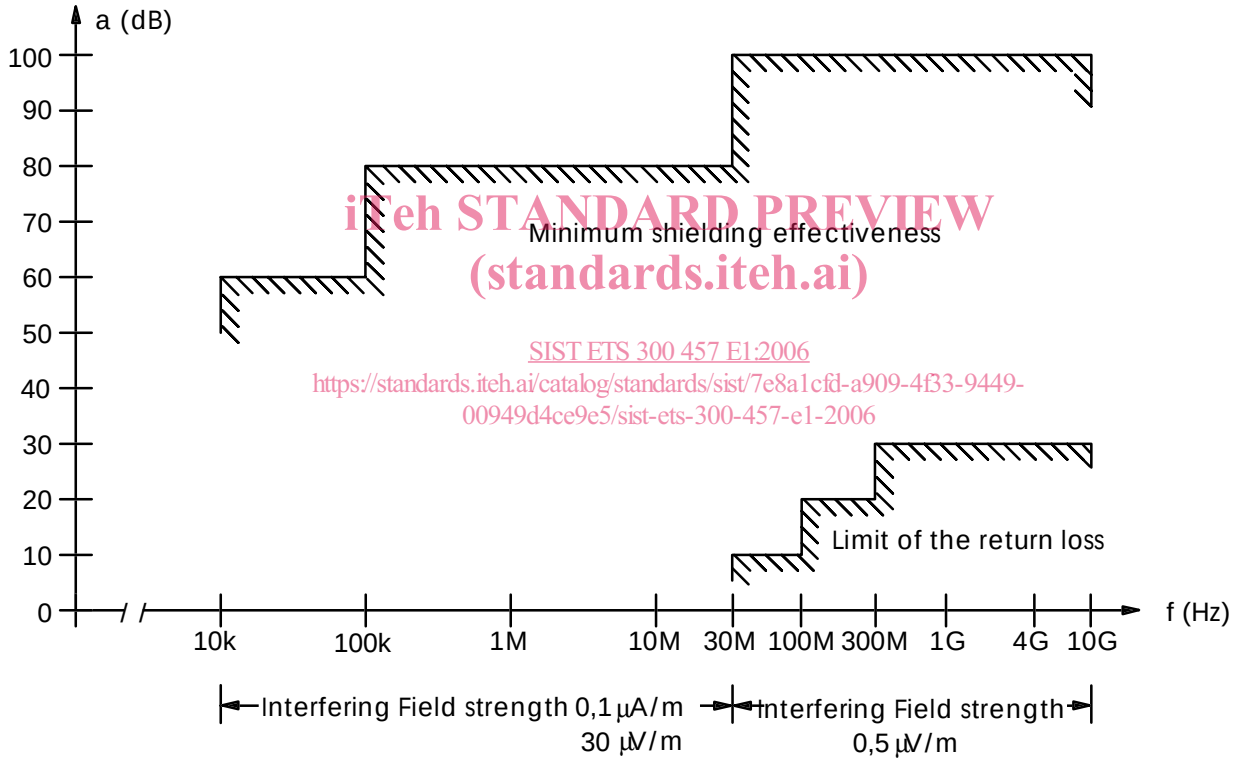
4.3 Anechoic chamber

4.3.1 General

An anechoic chamber is a well shielded chamber covered inside with radio frequency absorbing material and simulating a free space environment. Absolute or relative measurements can be performed, absolute measurements of field strength require the anechoic chamber to be calibrated. This is the type of chamber often used for immunity measurements.

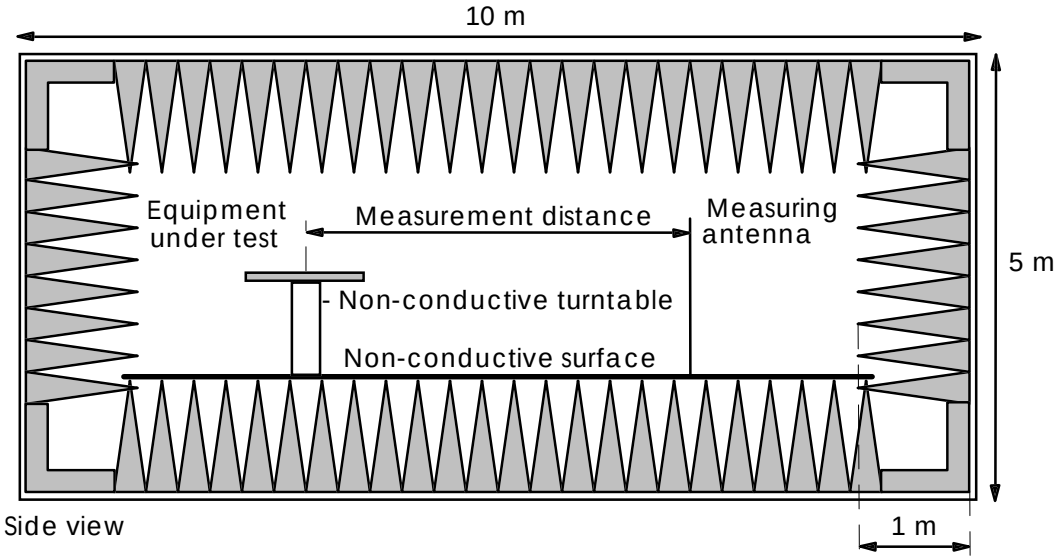
4.3.2 Description

An anechoic chamber shall meet appropriate requirements for shielding effectiveness and wall return loss. Figure 1 shows an example of such requirements. Figure 2 shows an example of the construction of an anechoic chamber having a base area of 5 m by 10 m and a height of 5 m, usually used for EMC measurements. The ceiling and walls are coated with pyramidal-formed absorbers approximately 1 m high. The base is covered with special absorbers which form the floor. The available internal dimensions of the chamber are 3 m by 8 m by 3 m, so that a maximum measuring distance of 5 m in the middle axis of this chamber is available. The floor absorbers reject floor reflections so that the measuring antenna height need not be changed during the calibration procedures. Figure 3 shows an example of a chamber that can be used for higher frequencies. Anechoic chambers of other dimensions may be used.



where: a is attenuation;
f is frequency.

Figure 1: Example of an anechoic shielded chamber for simulated free-space measurements



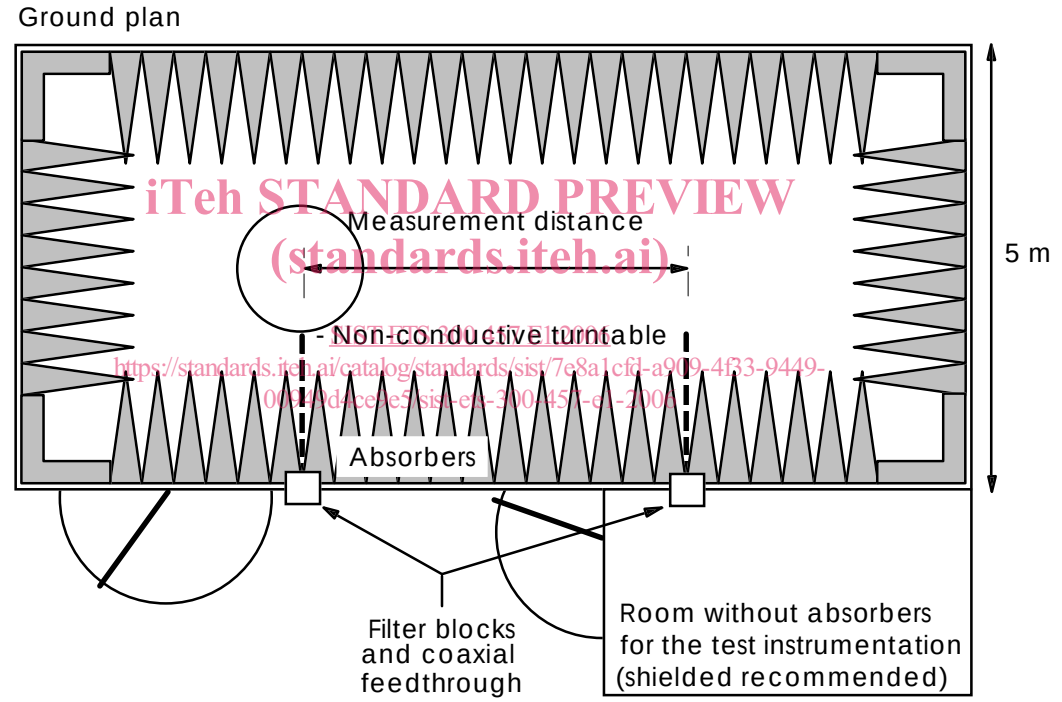


Figure 2: Example of an anechoic shielded chamber for simulated free-space measurements below 3 GHz