SLOVENSKI STANDARD

SIST EN 55016-1-4:2005/A1:2005

julij 2005

Specifikacija za merilne naprave in metode za merjenje radijskih motenj in odpornosti – 1-4. del: Merilne naprave za merjenje radijskih motenj in odpornosti – Pomožna oprema – Sevane motnje (CISPR 16-1-4:2003/A1:2004)

Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-4: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Radiated disturbances (CISPR 16-1-4:2003/A1:2004)

ICS 17.240; 33.100.20

Referenčna številka
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ICS 33.100.10; 33.100.20

English version

Specification for radio disturbance and immunity measuring apparatus and methods
Part 1-4: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Radiated disturbances

(CISPR 16-1-4:2003/A1:2004)

Spécifications des méthodes et des appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques
Partie 1-4: Appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques – Matériels auxiliaires – Perturbations rayonnées
(CISPR 16-1-4:2003/A1:2004)

Anforderungen an Geräte und Einrichtungen sowie Festlegung der Verfahren zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit
Teil 1-4: Geräte und Einrichtungen zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit – Zusatz-/Hilfseinrichtungen – Gestrahlte Störaussendung
(CISPR 16-1-4:2003/A1:2004)

This amendment A1 modifies the European Standard EN 55016-1-4:2004; it was approved by CENELEC on 2005-03-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This amendment exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 55016-1-4:2004/A1:2005 E

Foreword

The text of amendment 1:2004 to the International Standard CISPR 16-1-4:2003, prepared by CISPR SC A, Radio-interference measurements and statistical methods, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as amendment A1 to EN 55016-1-4:2004 on 2005-03-01 without any modification.

The following dates were fixed:

– latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2006-03-01

– latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2008-03-01

Endorsement notice

The text of amendment 1:2004 to the International Standard CISPR 16-1-4:2003 was approved by CENELEC as an amendment to the European Standard without any modification.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

CISPR 16-1-4

2003

AMENDMENT 1
2004-03

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

Amendment 1

Specification for radio disturbance and immunity measuring apparatus and methods –

Part 1-4: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Radiated disturbances

*This **English-language** version is derived from the original **bilingual** publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.*

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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FOREWORD

This amendment has been prepared by CISPR subcommittee A: Radio interference measurements and statistical methods.

The text of this amendment is based on the following documents:

FDIS	Report on voting
CISPR/A/499/FDIS	CISPR/A/514/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until 2005. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

Page 15

3 Definitions

Add, after definition 3.10 on page 17, the following new definitions:

3.11
fully anechoic room
FAR
shielded enclosure, the internal surfaces of which are lined with radio-frequency absorbing material (i.e. RF absorber), which absorbs electromagnetic energy in the frequency range of interest

3.12
quasi-free space test-site
test-site for which the site attenuation measured with vertically polarized tuned dipoles deviates by no more than ± 1 dB from the calculated free-space attenuation at any frequency

3.13
test volume
volume in the FAR in which the EUT is positioned

NOTE In this volume the quasi-free space condition is met and this volume is typically 0,5 m or more from the absorbing material of the FAR.

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5.7 Alternative test site suitability

Replace the title of this subclause by the following new title:

5.7 Test site suitability with ground-plane

Page 57

Add, after Table 2, the following new subclause:

5.8 Test site suitability without ground-plane

The procedure for test sites without ground-plane in the frequency range 30 MHz to 1 000 MHz is as follows.

5.8.1 Measurement considerations for free space test sites, as realized by fully absorber-lined shielded enclosures

A fully absorber lined shielded enclosure, also known as a fully anechoic chamber (FAC), or a fully anechoic room (FAR), may be used for radiated emission measurements. When the FAR method is used, appropriate radiated emission limits shall be defined in relevant standards (generic, product or product family standards). Compliance with the radio services protection requirements (limits) shall be established for FARs in a similar way as for tests on an OATS.

A FAR is intended to simulate a free space environment such that only the direct ray from the transmitting antenna or EUT reaches the receiving antenna. All indirect and reflected waves shall be minimized with the use of appropriate absorbing material on all walls, the ceiling and the floor of the FAR.

5.8.2 Site performance

Site performance may be validated by two methods which are described below – the site reference method and the *NSA* method.

5.8.2.1 Theoretical normalized site attenuation

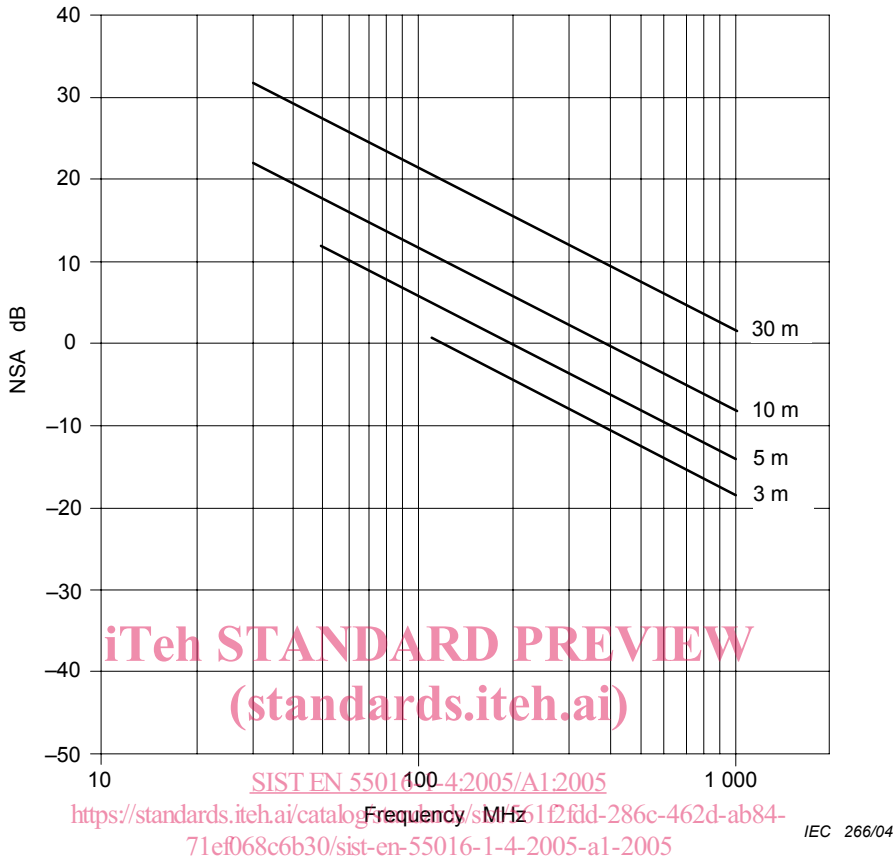

Figure 9 – Graph of theoretical free-space *NSA* as a function of the frequency for different measurement distances (see equation 4)

NOTE Frequencies below 110 MHz for 3 m measurement and below 60 MHz for 5 m measurement distances include near field effects. These must be calculated for each individual test site.

The following describes the *NSA* theory for infinitely small antennas.

Site attenuation (*SA*) is the transmission loss measured between the connectors of two antennas on a particular site. For a free space environment, *SA* (in dB) can be approximated by Equation (2)[1)]

$$SA = 20\log_{10}\left[\left(\frac{5Z_0}{2\pi}\right)\left(\frac{d}{\sqrt{1-\frac{1}{(\beta d)^2}+\frac{1}{(\beta d)^4}}}\right)\right] - 20\log_{10} f_m + AF_R + AF_T \qquad (2)$$

1) Reference: GARBE, H. New EMC Test Facilities for Radiation Measurements. *Review of Radio Science 1999-2002*. John Wiley & Sons, New York, 2002

where

AF_R, AF_T are the antenna factors of the receive and transmit antennas in dB/m;

d is the distance between the phase centres of both antennas in metres;

Z_0 is the reference impedance (i.e. 50 Ω);

ß is defined as $2\pi / \lambda$; and

f_m is the frequency in MHz.

The theoretical normalized site attenuation (*NSA*) in dB is defined as site attenuation with respective antenna factors subtracted, thus:

$$NSA_{calc} = 20\log_{10}\left[\left(\frac{5Z_0}{2\pi}\right)\left(\frac{d}{\sqrt{1-\frac{1}{(\beta d)^2}+\frac{1}{(\beta d)^4}}}\right)\right] - 20\log_{10} f_m \qquad (3)$$

Below 60 MHz at a 5 m distance or 110 MHz at a 3 m distance, it is necessary to apply near field correction factors for each of the required test positions of Table 3 for comparison with the theoretical *NSA* of Figure 9 and Equation (2). Near field correction factors are specific to the antennas, test distance, and test volume used, and therefore must be obtained by using a numerical modelling code such as NEC. Alternatively the site reference method of 5.8.2.2.1 provides cancellation of near field terms if the same antennas and frequencies are used for both the site reference measurement and FAR validation.

For measurement distances of 10 m and 30 m, the near-field terms in Equation (3) may be omitted, and the equation simplifies as follows:

$$NSA_{calc} = 20\log_{10}\left[\frac{5Z_0 d}{2\pi}\right] - 20\log_{10} f_m \qquad (4)$$

If simplified Equation (4), is used instead of Equation (2) the error introduced is less than 0,1dB at frequencies above 60 MHz for 5 m distance and above 110 MHz for 3 m distance. The error will be >0,1 dB below these frequencies due to near-field effects. For a 3 m distance the maximum error is 1 dB at 30 MHz. To reduce this error Equation (2) should be used.

5.8.2.2 Site validation procedure

The *NSA* shall satisfy the requirement of 5.8.3 over a cylindrical test volume generated by the rotation of the EUT on the turntable. In this context “the EUT“ includes all components of a multi-unit EUT and the interconnecting cables. Table 3 defines the maximum height and diameter (h_{max} = d_{max}) of the test volume as a function of test distance. This ratio between diameter and test distance ensures an acceptable uncertainty in EUT emissions testing.