SLOVENSKI STANDARD

SIST EN 55016-1-2:2005/A1:2005

julij 2005

Specifikacija za merilne naprave in metode za merjenje radijskih motenj in odpornosti – 1-2. del: Merilne naprave za merjenje radijskih motenj in odpornosti – Pomožna oprema – Motnje po vodnikih - Dopolnilo A1 (CISPR 16-1-2-2003/A1:2004)

Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances (CISPR 16-1-2-2003/A1:2004)

ICS 17.220.20; 33.100.20

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EUROPEAN STANDARD **EN 55016-1-2/A1**

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English version

Specification for radio disturbance and immunity measuring apparatus and methods Part 1-2: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Conducted disturbances

(CISPR 16-1-2:2003/A1:2004)

Spécifications des méthodes et des appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques
Partie 1-2: Appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques – Matériels auxiliaires – Perturbations conduites
(CISPR 16-1-2:2003/A1:2004)

Anforderungen an Geräte und Einrichtungen sowie Festlegung der Verfahren zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit
Teil 1-2: Geräte und Einrichtungen zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit – Zusatz-/Hilfseinrichtungen – Leitungsgeführte Störaussendung
(CISPR 16-1-2:2003/A1:2004)

This amendment A1 modifies the European Standard EN 55016-1-2:2004; it was approved by CENELEC on 2005-02-01. 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

Foreword

The text of amendment 1:2004 to the International Standard CISPR 16-1-2:2003, 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 55016-1-2:2004 on 2005-02-01 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) 2006-02-01

– latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2008-02-01

Endorsement notice

The text of amendment 1:2004 to the International Standard CISPR 16-1-2:2003 was approved by CENELEC as an amendment to the European Standard without any modification.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

CISPR 16-1-2

2003

AMENDMENT 1
2004-04

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

Amendment 1

Specification for radio disturbance and immunity measuring apparatus and methods –

Part 1-2: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Conducted 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
CIS/A/503/FDIS	CIS/A/521/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 2006. At this date, the publication will be

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

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5.2 Voltage probe

Add the title of new subclause 5.2.1 as follows:

5.2.1 High impedance voltage probe

Insert, immediately after the title of new subclause 5.2.1, the existing text of subclause 5.2.

Add the following new subclause:

5.2.2 Capacitive voltage probe

The asymmetrical disturbance voltages of cables can be measured without making direct conductive contact with the source conductor and without modification of its circuit by the use of a clamp-on capacitive coupling device. The usefulness of this method is self-evident; complex wiring systems, electronic circuits, etc. may be measured without interruption of the normal operation or configuration of the EUT or the need to cut the cable to insert a measuring device. The capacitive voltage probe is constructed so that it may be conveniently clamped around the conductor to be measured.

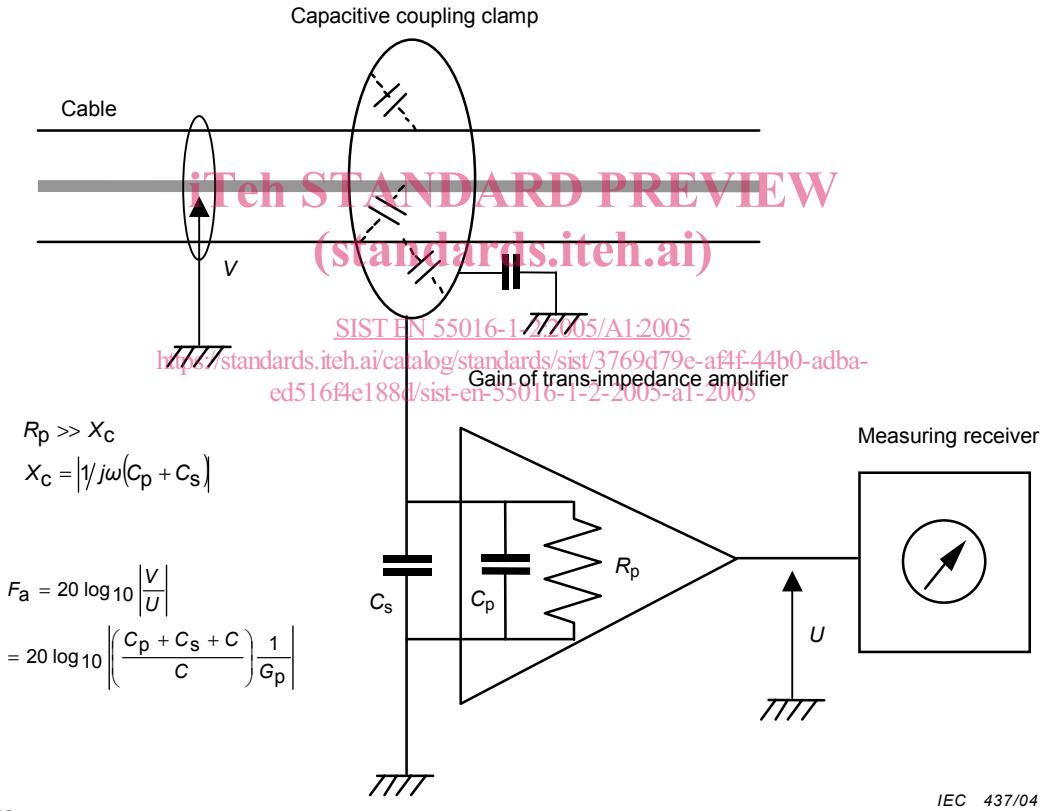
The capacitive voltage probe is used for measurements of conducted disturbances in the frequency range 150 kHz to 30 MHz with an almost flat frequency response in the frequency range of interest. The voltage division factor, which is defined as the ratio of the disturbance voltage on the cable to the input voltage at the measuring receiver, depends on the type of cable. This parameter should be calibrated over a specified frequency range for each cable type, using the method described in Annex G.

The capacitive voltage probe may need additional shielding to provide sufficient isolation from the asymmetrical (common mode) signal around the cable (see "Influence of electric field" in 5.2.2.2). Annex G contains an example of the construction and a method of measurement for the isolation.

This capacitive voltage probe can be used to measure the disturbances at telecommunication ports. The minimum measurable level is typically up to 44 dB(µV).

5.2.2.1 Construction

The capacitive voltage probe shall be constructed so as to enable the measurement of the voltage without disconnecting the cable under measurement. Figure 11 shows a circuit that is used to make voltage measurements between a cable and a reference ground. The probe consists of a capacitive coupling clamp which is connected to a trans-impedance amplifier. The input resistance R_p of this amplifier shall be large enough compared to the reactance X_c to obtain a flat frequency response.



Key

G_p Gain of trans-impedance amplifier
C Capacitance between the cable and the clamp
C_s Capacitance between probe and ground
C_p Capacitance of trans-impedance amplifier
R_p Resistance of trans-impedance amplifier
V Disturbance voltage
U Voltage at the input of the measuring receiver

Figure 11 – Circuit used to make voltage measurement between a cable and a reference ground

Annex G provides instructions for the typical construction and verification of the capacitive voltage probe.

5.2.2.2 Requirements

Added shunt capacitance:	Less than 10 pF between the grounding terminal of capacitive voltage probe and the cable under test.
Frequency response:	Voltage division factor, F_a = 20 $\log_{10}\lvert V/U\rvert$ in dB (see Figure 11), is calibrated over a specified frequency range.
Pulse response:	Maintain linearity for the pulse determined by the method in Annexes B and C of CISPR 16-1-1 for band B.
Influence of electric field: (influence caused by electrostatic coupling with other cables near the probe)	The voltage indication is reduced by more than 20 dB when a cable is removed from the capacitive voltage probe. The measurement method is described in Annex G.
Capacitive voltage probe aperture or opening: (aperture when the two coaxial electrodes open at the slot (see Figure G.1))	At least 30 mm

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Figure 6 – Circuit for RF voltage measurement on supply mains

Change the existing title of Figure 6 to read as follows:

Figure 6 – Circuit for RF voltage measurement on supply mains (see 5.2.1)

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Add, after Annex F, the new Annex G as follows:

Annex G
(informative)

Construction and evaluation of capacitive voltage probe (subclause 5.2.2)

G.0 Introduction

This annex provides an example of a method for the calibration of the capacitive voltage probe (CVP). Other calibration methods can be used if their uncertainty is considered to be equivalent to that of the method shown in this annex.

G.1 Physical and electrical considerations for capacitive voltage probe

Figure G.1 shows the configuration of a capacitive voltage probe. It is made up of two coaxial electrodes, a grounding terminal, a cable fixture, and a trans-impedance amplifier. The outer electrode is used as an electrostatic shield to reduce the measurement error caused by electrostatic coupling from cables running alongside.

The equivalent circuit of the probe is shown in Figure G.2. When a voltage exists between the cable and the ground, an induced voltage occurs between the inner electrode and the outer electrode as a result of electrostatic induction. This voltage is detected by a high impedance input amplifier and converted to low impedance by a trans-impedance amplifier. The output is measured by a measuring receiver.

G.2 Determination of the frequency response of the voltage division factor

Figure G.3 shows the test set-up used to determine the frequency response of the capacitive voltage probe. The probe is verified according to the following procedures.

a) Prepare the same type of cable which is used with the equipment under test (EUT).

   NOTE If several types of cable are used with the probe, a representative variety of cable types shall be used in the calibration and the spread of results determined. The voltage division factor (F_a) can be estimated by using equation (G.3), however, it is recommended to measure the F_a for each cable.

b) Place the calibration fixture on the reference ground plane, as shown in Figure G.3.

c) Connect both ends of the cable to the inner ports of the calibration fixture (port-1, port-2) (see Figure G.3).

d) Place the probe in the calibration unit and adjust the position of the cable to pass through the centre.

   Caution: If the end of plates of the calibration fixture are too close to the ends of the voltage probe, the stray capacitance is increased, which can adversely affect the calibration at higher frequencies. If the end plates of the calibration fixture get too far from the ends of the voltage probe, a standing wave may be formed within the calibration fixture at higher frequencies. These standing waves can adversely affect the calibration.

e) Connect the grounding port of the probe to the inner grounding port of the calibration fixture. Connect the outer grounding port of the calibration fixture to the reference ground plane. The grounding strip should have low inductance, be as short as possible and kept away from the voltage probe aperture.