SLOVENSKI STANDARD
SIST EN 55016-2-1:2014/A1:2018

01-januar-2018

Specifikacija za merilne naprave in metode za merjenje radijskih motenj in odpornosti - 2-1. del: Metode za merjenje radijskih motenj in odpornosti - Merjenje motenj po vodnikih - Dopolnilo A1

Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-1: Methods of measurement of disturbances and immunity - Conducted disturbance measurements

Anforderungen an Geräte und Einrichtungen sowie Festlegung der Verfahren zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit - Teil 2-1: Verfahren zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit - Messung der leitungsgeführten Störaussendung

Spécifications des méthodes et des appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques - Partie 2-1: Méthodes de mesure des perturbations et de l'immunité - Mesures des perturbations conduites

Ta slovenski standard je istoveten z: **EN 55016-2-1:2014/A1:2017**

ICS:

17.220.20	Merjenje električnih in magnetnih veličin	Measurement of electrical and magnetic quantities
33.100.20	Imunost	Immunity

SIST EN 55016-2-1:2014/A1:2018 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 55016-2-1:2014/A1

October 2017

ICS 33.100.10; 33.100.20

English Version

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This amendment A1 modifies the European Standard EN 55016-2-1:2014; it was approved by CENELEC on 2017-08-04. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

The text of document CISPR/A/1168/CDV, future CISPR 16-2-1:2014/A1, prepared by SC CISPR A "Radio-interference measurements and statistical methods" of IEC/TC CISPR "International special committee on radio interference" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 55016-2-1:2014/A1:2017.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2018-05-04
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2020-08-04

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard CISPR 16-2-1:2014/A1:2017 was approved by CENELEC as a European Standard without any modification.

CISPR 16-2-1

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AMENDMENT 1
AMENDEMENT 1

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Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 33.100.10, 33.100.20

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FOREWORD

This amendment has been prepared by subcommittee CISPR A: Radio-interference measurements and statistical methods, of IEC technical committee CISPR: International special committee on radio interference.

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

CDV	Report on voting
CISPR/A/1168/CDV	CISPR/A/1201/RVC

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 this amendment and the base publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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

IMPORTANT – The "colour inside" logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

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1 Scope

Replace the existing first paragraph by the following new paragraph:

This part of CISPR 16 is designated a basic standard that specifies the methods of measurement of disturbance phenomena in general in the frequency range 9 kHz to 18 GHz, and especially of conducted disturbance phenomena in the frequency range 9 kHz to 30 MHz. The CDNE extends the frequency range of conducted disturbance measurements to 300 MHz.

3.1 Terms and definitions

3.1.2
artificial network
AN

Replace the existing definition and note by the following new definition and new note:

network that provides a defined impedance to the EUT at radio frequencies, couples the disturbance voltage to the measuring receiver, and decouples the test circuit from the mains network or other power lines or from signal lines with associated equipment

Note 1 to entry: There are four basic types of this network: the V-network (V-AN), which couples the unsymmetric voltages; the delta-network (Δ-AN), which couples symmetric (DM) and asymmetric (CM) voltages separately; the Y-network (Y-AN); and the coaxial (screened cable) network, which couple asymmetric (CM) voltages.

3.1.3
artificial mains network
AMN

Replace the existing Note 1 to entry by the following new note:

Note 1 to entry: There are two basic types of this network: the V-network (V-AMN), which couples the unsymmetric voltages; and the delta-network (Δ-AMN), which couples symmetric (DM) and asymmetric (CM) voltages separately.

3.1.6
asymmetric voltage

Replace the existing definition and note by the following new definition and new note:

RF voltage appearing between the electrical mid-point of the individual terminals or leads in a two- or multi-wire circuit and reference ground, sometimes called the CM voltage

Note 1 to entry: If, in case of a LV AC mains power port, V_a is the vector voltage between one of the mains terminals and reference ground, and V_b is the vector voltage between the other mains terminal and reference ground, the asymmetric voltage is half the vector sum of V_a and V_b, i.e. $(V_a + V_b)/2$.

3.1.7
symmetric voltage

Replace the existing definition and note by the following new definition and new note:

RF voltage appearing between any pair of wires not comprising the wire at ground potential in a two- or multi-wire circuit, such as a single-phase mains supply or a bundle of twisted pairs in a communication cable, sometimes called the DM voltage

Note 1 to entry: In case of a LV AC mains power port, the symmetric voltage is the vector difference $(V_a - V_b)$.

3.1.8
unsymmetric mode voltage

Replace the existing term, definition and notes by the following new term, definition and note:

3.1.8
unsymmetric voltage
RF voltage appearing between an individual terminal or lead in a two- or multi-wire circuit and reference ground

Note 1 to entry: The unsymmetric voltage is the voltage measured by the use of an artificial mains V-network. It denotes the amplitude of the vector voltage, V_a or V_b (mentioned in the notes to entry in 3.1.6 and 3.1.7).

3.1.25
reference ground plane
RGP

Replace the existing definition and notes by the following new definition and new notes:

flat, conductive surface that is at the same electric potential as reference ground, which is used as a common reference, and which contributes to a reproducible parasitic capacitance with the surroundings of the EUT

Note 1 to entry: A reference ground plane is needed for the measurements of conducted disturbances, and serves as reference for the measurement of unsymmetric and asymmetric disturbance voltages.

Note 2 to entry: This note applies to the French language only.

Note 3 to entry: In some regions, the term ‘reference earth’ is used in place of ‘reference ground’.

3.2 Abbreviations

Add to the existing list the following new abbreviations:

DM	Differential mode
Δ-AN	Artificial Δ-network ('Δ' is pronounced 'delta')
GCPC	Grid connected power convertor
LV	Low voltage
RFI	Radio frequency interference
UM	Unsymmetric mode
V-AMN	Artificial mains V-network
V-AN	Artificial V-network
Y-AN	Artificial Y-network

5.3 Connections to RF reference ground

Delete, in the existing title, the abbreviated term "RF"*.*

Replace the second paragraph (the paragraph following NOTE 1) by the following new paragraphs:

The measurement of unsymmetric (UM) or terminal voltages and asymmetric (CM) voltages shall be referenced only to the reference ground. Ground loops (common impedance coupling) shall be avoided. Ground loops will negatively affect repeatability of measurement and can, e.g. be detected if grounded components of a test set-up are touch-sensitive. This should also be observed for measuring apparatus (e.g. measuring receivers and connected ancillary equipment, such as oscilloscopes, analyzers, recorders, etc.) fitted with a PE conductor of safety class I equipment.

NOTE 3 A detrimental ground loop can be detected when the components of a test set-up are touch-sensitive, i.e. the reading changes when the component is touched.

The measuring instrumentation shall be provided with RF isolation so that the AN has only one RF connection to reference ground. This can be accomplished by using RF chokes and isolation transformers, or by powering the measuring apparatus from batteries. Figure 1 shows an example of a recommended test set-up with three AMNs and PE chokes for the avoidance of ground loops. In this figure, also the receiver RF connecting cable to the AMN can act as a ground connection if the receiver is grounded. Therefore, either a PE choke is needed at the receiver power input, or, if the receiver is outside a shielded room, a sheath current suppressor is needed on the connecting cable. Each AMN is thus RF-grounded only once.

5.4 Connections between the EUT and the artificial mains network

Delete, in the existing title, the word "mains"*.*

Add, after the existing first sentence of this subclause, the following new sentence:

The same guidelines also apply for selection of connections of the EUT to other types of AN used for the termination of ports other than LV AC mains ports.

6.4.5 Supply

Replace the existing text of this subclause by the following new text:

The EUT shall be operated from a supply having the rated voltage of the EUT. EUTs with more than one rated voltage shall be tested at the rated voltage which causes maximum disturbance. Product standards may call for additional measurements at supply voltages within the rated supply voltage range, if, for example, the levels of disturbance vary considerably with the actual supply voltage used during the measurements.

7.1 General

Replace the existing item a), including the note, by the following new item:

a) *the types of disturbance:* there are two methods of measuring conducted disturbances, either as a voltage (prevailing method for CISPR measurements) or as a current. Both methods can be used to measure the three types of conducted disturbance, i.e.:

   – common mode (also called asymmetric mode, i.e. the vector sum of voltages/currents in a bundle or group of wires in relation to reference ground);

   – differential mode (also called symmetric mode);

   – unsymmetric mode (voltage between a terminal of the port under test and reference ground).

   NOTE The unsymmetric voltage is primarily measured at the LV AC mains power port. The CM voltage (or current) is measured primarily at telecommunication, signal and control ports.

7.3.2.1 General

Replace the existing text of this subclause by the following new text:

The CM, DM and UM impedances of actual networks, such as power mains and telecommunication networks, are location dependent and, in general, time varying. Therefore, type testing of disturbance requires standardized impedance simulation networks, referred to as artificial networks (ANs). The AN provides standardized RF load impedances to the EUT and simultaneously decouples the laboratory LV AC mains and/or DC power source or other type of peripheral and ancillary equipment, like a signal simulator, from the EUT. For this purpose, the AN is inserted between the terminals of the EUT and the actual network or signal simulator. In this way, the AN simulates extended networks (long lines) with defined impedances.

7.3.2.2 Types of artificial networks

Replace the existing text, including items a), b) and c), by the following new text:

The ANs specified in CISPR 16-1-2 shall be used, unless specific reasons call for another construction. In general, three types of AN can be distinguished:

a) *V-AN (typically used as V-AMN, or LISN):* in a defined frequency range, the RF impedances between each of the EUT terminals to be measured and the reference ground have a defined value, whereas no additional separate impedance component is connected directly between these terminals. The construction defines (indirectly) the measurement of the vector sum of both the symmetric (DM) and asymmetric (CM) voltages, i.e. of the composite unsymmetric (UM or terminal) disturbance voltage. In principle, there is no limit for the number of EUT terminals, i.e. for the number of lines to be measured by V-ANs;

b) *Δ-AN:* in a defined frequency range, the RF impedances between a pair of EUT terminals to be measured (and not comprising the grounding terminal) and between the electrical mid-point of these terminals and the reference ground have defined values. This construction defines directly both the symmetric (DM) and the asymmetric (CM) RF load impedances. Addition of a balance/unbalance transformer makes it possible to measure the symmetric (DM) and asymmetric (CM) disturbance voltages separately. Practical implementations of Δ-ANs are presently (2016) furnished only with connectors for a total of three individual EUT terminals, inclusive of common ground;

c) *Y-AN (also called the asymmetric artificial network, AAN, or ISN):* in a defined frequency range, the CM RF impedance between the electrical mid-point of a pair of EUT terminals