

SLOVENSKI STANDARD
SIST EN 55016-2-1:2009/A2:2013
01-september-2013

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 A2

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

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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 55016-2-1:2009/A2:2013

ICS:

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

SIST EN 55016-2-1:2009/A2:2013 **en**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 55016-2-1/A2

May 2013

ICS 33.100.10; 33.100.20

English version

**Specification for radio disturbance and immunity
measuring apparatus and methods -
Part 2-1: Methods of measurement of disturbances and immunity -
Conducted disturbance measurements
(CISPR 16-2-1:2008/A2:2013)**

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
(CISPR 16-2-1:2008/A2:2013)

Anforderungen an Geräte und
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der Verfahren zur Messung der
hochfrequenten Störaussendung
(Funkstörungen) und Störfestigkeit -
Teil 2-1: Verfahren zur Messung der
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Messung der leitungsgeführten
Störaussendung
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This amendment A2 modifies the European Standard EN 55016-2-1:2009; it was approved by CENELEC on 2013-04-22. 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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CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document CISPR/A/1023/FDIS, future amendment 2 to edition 2 of CISPR 16-2-1, prepared by SC 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 55016-2-1:2009/A2:2013.

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) 2014-01-22
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-04-22

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

Endorsement notice

The text of the International Standard CISPR 16-2-1:2008/A2:2013 was approved by CENELEC as a European Standard without any modification.

In the Bibliography of EN 55016-2-1:2009, the following notes have to be **added** for the standards indicated:

IEC 61000-4-6:2008	NOTE	Harmonised as EN 61000-4-6:2009 (not modified).
CISPR 16 Series	NOTE	Harmonised as EN 55016 Series (not modified).

Annex ZA
(normative)

**Normative references to international publications
with their corresponding European publications**

Replacement in Annex ZA of EN 55016-2-1:2009:

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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*In Annex ZA of EN 55016-2-1:2009, **replace** the existing reference to CISPR 16-1-2 by the following new reference:*

CISPR 16-1-2	2003	Specification for radio disturbance and	EN 55016-1-2	2004
+ corr. January	2009	immunity measuring apparatus and methods + A1	+ A1	2005
+ A1	2004	- Part 1-2: Radio disturbance and immunity	+ A2	2006
+ A2	2006	measuring apparatus - Ancillary equipment - Conducted disturbances		

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CISPR 16-2-1

Edition 2.0 2013-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE
COMITÉ INTERNATIONAL SPÉCIAL DES PERTURBATIONS RADIOÉLECTRIQUES

AMENDMENT 2
AMENDEMENT 2

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Specification for radio disturbance and immunity measuring apparatus and methods –

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

**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**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

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ICS 33.100.10; 33.100.20

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FOREWORD

This amendment has been prepared by subcommittee 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:

FDIS	Report on voting
CISPR/A/1023/FDIS	CISPR/A/1029/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 this publication will remain unchanged until the stability date indicated on the IEC web site 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.

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2 Normative references

[SIST EN 55016-2-1:2009/A2:2013](https://standards.iteh.ai/catalog/standards/sist/ba429971-a264-4195-b1aa-96edcb05dbec/sist-en-55016-2-1-2009-a2-2013)

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Replace the existing reference to CISPR 16-1-2 by the following new reference:

CISPR 16-1-2:2003, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Conducted disturbances*
Amendment 1:2004
Amendment 2:2006

3 Definitions

Add, after definition 3.34 added by Amendment 1, the new terms and definitions 3.35 and 3.36 as follows:

3.35

total common mode impedance

TCM impedance

impedance between the cable attached to the EUT port under test and the reference ground plane

NOTE The complete cable is seen as one wire of the circuit and the ground plane as the other wire of the circuit. The TCM wave is the transmission mode of electrical energy, which can lead to radiation of electrical energy if the cable is exposed in the real application. Vice versa, this is also the dominant mode, which results from exposure of the cable to external electromagnetic fields.

3.36

asymmetric artificial network

AAN

network used to measure (or inject) asymmetric (common mode) voltages on unshielded symmetric signal (e.g. telecommunication) lines while rejecting the symmetric (differential mode) signal

NOTE 1 An AAN is an AN (artificial network) that provides a simulation of the asymmetric load realized by the telecommunication network.

NOTE 2 The term “Y-network” is a synonym for AAN.

NOTE 3 The AAN can also be used for immunity testing, where the receiver measurement port becomes the disturbance injection port.

6.4 Operating conditions of the EUT

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

6.4 EUT arrangement and measurement conditions

6.4.1 General

Replace the existing title and text of this subclause as follows:

6.4.1 EUT arrangement

6.4.1.1 General

Where not specified in the product standard, the EUT shall be configured as described in the following paragraphs.

The EUT shall be installed, arranged and operated in a manner consistent with typical applications. Where the manufacturer has specified or recommended an installation practice, such practice shall be used in the test arrangement, where possible. This arrangement shall be typical of the normal installation practice. Interface cables, loads and devices shall be connected to at least one of each type of interface port of the EUT, and where practical, each cable shall be terminated in a device typical of actual usage.

Where there are multiple interface ports of the same type, additional interconnecting cables, loads and devices may need to be added to the EUT depending upon the results of preliminary tests. The number of additional cables or wires of the same type should be limited to the condition where the addition of another cable or wire does not significantly affect the emission level, i.e. varies by less than 2 dB, provided that the EUT remains compliant. The rationale for the selection of the configuration and loading of ports shall be included in the test report.

Interconnecting cables should be of the type and length specified in the individual equipment requirements. If the length can be varied, the length shall be selected to produce maximum disturbance.

If shielded or special cables are used during the tests to achieve compliance, a note shall be included in the instruction manual advising of the need to use such cables.

Excess lengths of cables shall be bundled at the approximate centre of the cable with the bundles 30 cm to 40 cm in length. If it is impractical to do so because of cable bulk or stiffness, the disposition of the excess cable shall be precisely noted in the test report.

Where there are multiple interface ports all of the same type, connecting a cable to just one of that type of port is sufficient, provided it can be shown that the additional cables would not significantly affect the results.

Any set of results shall be accompanied by a complete description of the cable and equipment orientation so that results can be repeated. If specific conditions of use are required to meet the limits, those conditions shall be specified and documented, for example cable length, cable type, shielding and grounding. These conditions shall be included in the instructions to the user.

Equipment that is populated with multiple modules (such as drawers and plug-in cards) shall be tested with a mix and number representative of that used in a typical installation. The number of additional boards or plug-in cards of the same type should be limited to the condition where the addition of another board or plug-in card does not significantly affect the emission level, i.e. varies by less than 2 dB, provided that the EUT remains compliant. The rationale used for selecting the number and type of modules should be stated in the test report.

A system that consists of a number of separate units shall be configured to form a minimum representative configuration. The number and mix of units included in the test configuration shall normally be representative of that used in a typical installation. The rationale used for selecting units should be stated in the test report.

One module of each type shall be operational in each equipment evaluated in an EUT. For an EUT comprising a system, one of each type of equipment that can be included in the possible system configuration shall be included in the EUT.

The results of an evaluation of EUTs having one of each type of module can be applied to configurations having more than one of each of those modules.

NOTE It has been found that disturbances from identical modules are generally not additive in practice.

The EUT position relative to the reference ground plane shall be equivalent to that occurring in use. Therefore, floor-standing equipment is placed on, but insulated from, a reference ground plane, and tabletop equipment is placed on a non-conductive table.

Equipment designed for wall-mounted operation shall be tested as tabletop EUT. The orientation of the equipment shall be consistent with normal installation practice.

Combinations of the equipment types identified above shall also be arranged in a manner consistent with normal installation practice. Equipment designed for both tabletop and floor standing operation shall be tested as tabletop equipment unless the usual installation is floor standing, then that arrangement shall be used.

The ends of signal cables attached to the EUT that are not connected to another unit or auxiliary equipment (AuxEq) shall be terminated using the correct terminating impedance defined in the product standard. If no product standard can be applied to the particular configuration, the termination shall be defined by the EUT manufacturer and noted in the test report.

Cables or other connections to auxiliary equipment located outside the test site shall drape to the floor, and then be routed to the place where they leave the test site.

Installation of AuxEq shall be in accordance with normal installation practice. Where this means that the AuxEq is located on the test site, it shall be arranged using the same conditions applicable for the EUT (for example, distance from the ground plane and insulation from the ground plane if floor standing, layout of cabling).

6.4.1.2 Arrangement of tabletop equipment

Equipment intended for tabletop use shall be placed on a non-conductive table. The size of the table will nominally be 1,5 m by 1,0 m but may ultimately be dependent on the horizontal dimensions of EUT.

Intra-unit cables shall be draped over the back of the table. If a cable hangs closer than 0,4 m from the horizontal ground plane (or floor), the excess shall be folded at the cable centre into a bundle no longer than 0,4 m, such that the part of the bundle closest to the horizontal reference ground plane is at least 0,4 m above the plane.

Cables shall be positioned as for normal usage.

If the mains port input cable is less than 0,8 m long (including power supplies integrated in the mains plug), an extension cable shall be used such that the external power supply unit is placed on the tabletop. The extension cable shall have similar characteristics to the mains cable (including the number of conductors and the presence of a ground connection). The extension cable shall be treated as part of the mains cable.

In the above arrangements, the cable between the EUT and the power accessory shall be arranged on the tabletop in the same manner as other cables connecting components of the EUT.

6.4.1.3 Arrangement of floor-standing equipment

The EUT shall be placed on the horizontal reference ground plane, orientated for normal use, but separated from metallic contact with the reference ground plane by up to 15 cm of insulation.

The cables shall be insulated (by up to 15 cm) from the horizontal reference ground plane. If the equipment requires a dedicated ground connection, then this shall be provided and bonded to the horizontal reference ground plane.

Intra-unit cables (between units forming the EUT or between the EUT and any auxiliary equipment) shall drape to, but remain insulated from, the horizontal reference ground plane. Any excess cable shall either be folded at the cable centre into a bundle no longer than 0,4 m or arranged in a serpentine fashion. If an intra-unit cable length is not long enough to drape to the horizontal reference ground plane but drapes closer than 0,4 m, then the excess shall be folded at the cable centre into a bundle no longer than 0,4 m. The bundle shall be positioned such that it is either 0,4 m above the horizontal reference ground plane or at the height of the cable entry or connection point if this is within 0,4 m of the horizontal reference ground plane.

For equipment with a vertical cable riser, the number of risers shall be typical of installation practice. Where the riser is made of non-conductive material, a minimum spacing of at least 0,2 m shall be maintained between the closest part of the equipment and the nearest vertical cable. Where the riser structure is conductive, the minimum spacing of 0,2 m shall be between the closest parts of the equipment and riser structure.

6.4.1.4 Arrangement for combinations of tabletop and floor-standing equipment

Intra-unit cables between a tabletop unit and a floor-standing unit shall have the excess cable folded into a bundle no longer than 0,4 m. The bundle shall be positioned such that it is either 0,4 m above the horizontal reference ground plane or at the height of the cable entry or connection point if this is within 0,4 m of the horizontal reference ground plane.

Add, after the existing Subclause 6.4.6, the new subclauses:

6.4.7 Operation of multifunction equipment

Multifunction equipment that is subjected simultaneously to different clauses of a product standard and/or different standards shall be tested with each function operated in isolation, if this can be achieved without modifying the equipment internally. The equipment thus tested shall be deemed to have complied with the requirements of all clauses/standards when each function has satisfied the requirements of the relevant clause/standard.

For equipment that it is not practical to test with each function operated in isolation, or where the isolation of a particular function would result in the equipment being unable to fulfil its primary function, or where the simultaneous operation of several functions would result in saving measurement time, the equipment shall be deemed to have complied if it meets the provisions of the relevant clause/standard with the necessary functions operated.

6.4.8 Determination of EUT arrangement(s) that maximizes emissions

Initial testing shall identify the frequency that has the highest disturbance relative to the limit. This identification shall be performed whilst operating the EUT in typical modes of operation and with cable positions in a test arrangement that is representative of typical installation practice.

The frequency of highest disturbance with respect to the limit shall be found by investigating disturbances at a number of significant frequencies. This provides confidence that the probable frequency of maximum disturbance has been found and that the associated cable, EUT arrangement and mode of operation has been identified.

For initial testing, the EUT should be arranged in accordance with the product standards as appropriate.

6.4.9 Recording of measurement results

Of those disturbances above ($L - 20$ dB), where L is the limit level in dB(μ V) or dB(μ A), the disturbance levels and the frequencies of at least the six disturbances having the smallest margin to the limit L shall be recorded.

In addition, the test report shall include the value of the measurement instrumentation uncertainty corresponding to the used test setup, calculated as per the requirements of CISPR 16-4-2.

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7.3.1 General

Replace the existing Note by the following new Note:

NOTE Some standards use the terms impedance stabilization network (ISN) for ANs for emission measurements on telecommunication ports (i.e. AANs or Y-networks).

7.3.3 Voltage probes

Replace the existing first paragraph of this subclause by the following new paragraph:

For specifications of voltage probes, see CISPR 16-1-2.

7.4.1 Arrangement of the EUT and its connection to the AN

Replace, in the fifth dashed item of the list of this subclause, the abbreviation "ISNs" by the new abbreviation "AANs."