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Information technology equipment — Immunity characteristics — Limits and methods of measurement

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The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by A1 A1.

The UK participation in its preparation was entrusted by Technical Committee GEL/210, EMC – Policy committee, to Subcommittee GEL/210/11, EMC product standards.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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Date	Text affected
31 July 2011	Implementation of CISPR corrigendum June 2011: modification of B.3.2
30 June 2015	Implementation of IEC amendment 1:2015 with CENELEC endorsement A1:2015

**Information technology equipment -
Immunity characteristics -
Limits and methods of measurement
(CISPR 24:2010)**

Appareils de traitement de l'information -
Caractéristiques d'immunité -
Limites et méthodes de mesure
(CISPR 24:2010)

Einrichtungen der Informationstechnik -
Störfestigkeitseigenschaften -
Grenzwerte und Prüfverfahren
(CISPR 24:2010)

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CENELEC

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

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Foreword

The text of document CIS/I/331/FDIS, future edition 2 of CISPR 24, prepared by CISPR SC I, Electromagnetic compatibility of information technology equipment, multimedia equipment and receivers, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 55024 on 2010-11-16.

This European Standard supersedes EN 55024:1998, EN 55024:1998/IS1:2007 + A1:2001 + A2:2003.

This EN 55024:2010 includes the following significant technical changes with respect to the previous edition:

- dated references updated;
- option of using a 4 % step size for continuous conducted immunity test deleted;
- revision of Annex A for telephony equipment including methodology for measuring the demodulation from a speaker / hands free device;
- inclusion of new annex related to DSL equipment.

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

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2011-09-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2013-12-01

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EU Directives 1999/5/EC and 2004/108/EC. See Annex ZZ.

Annexes ZA and ZZ have been added by CENELEC.

Endorsement notice

The text of the International Standard CISPR 24:2010 was approved by CENELEC as a European Standard without any modification.

Foreword to amendment A1

The text of document CIS/1/500/FDIS, future CISPR 24:2010/A1, prepared by CISPR SC I "Electromagnetic compatibility of information technology equipment, multimedia equipment and receivers" of CISPR "International special committee on radio interference" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 55024:2010/A1:2015.

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) 2016-02-22
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-05-22

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.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directives, see informative Annex ZZ, included in EN 55024:2010.

Endorsement notice

The text of the International Standard CISPR 24:2010/A1:2015 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-161	1990	International Electrotechnical Vocabulary (IEV) - Chapter 161: Electromagnetic compatibility	-	-
IEC 60318-1	2009	Electroacoustics - Simulators of human head and ear - Part 1: Ear simulator for the measurement of supra-aural and circumaural earphones	EN 60318-1	2009
IEC 61000-4-2	2008	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	EN 61000-4-2	2009
IEC 61000-4-3 + A1 + A2	2006 2007 2010	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	EN 61000-4-3 + A1 + A2	2006 2008 2010
IEC 61000-4-4	2004	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	EN 61000-4-4	2004
IEC 61000-4-5	2005	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5	2006
IEC 61000-4-6	2008	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6	2009
IEC 61000-4-8	2009	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test	EN 61000-4-8	2010
IEC 61000-4-11	2004	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	EN 61000-4-11	2004

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
CISPR 16-1-2 + A1 + A2	2003 2004 2006	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances	EN 55016-1-2 + A1 + A2	2004 2005 2006
CISPR 20	2006	Sound and television broadcast receivers and associated equipment - Immunity characteristics - Limits and methods of measurement	EN 55020	2007
CISPR 22 (mod)	2008	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	EN 55022	201X ¹⁾

¹⁾ To be published.

Annex ZZ (informative)

Coverage of Essential Requirements of EC Directives

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers protection requirements Annex I, Article 1(b) of the EC Directive 2004/108/EC, and essential requirements of Article 3.1(b) (immunity only) of the EC Directive 1999/5/EC.

Compliance with this standard provides presumption of conformity with the specified essential requirements of the Directives concerned.

NOTE Other requirements and other EC Directives may be applicable to the products falling within the scope of this standard.

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INTRODUCTION

This CISPR publication establishes uniform requirements for the electromagnetic immunity of information technology equipment. The test methods are given in the referenced Basic EMC Immunity Standards. This publication specifies applicable tests, test levels, product operating conditions and assessment criteria.

INFORMATION TECHNOLOGY EQUIPMENT – IMMUNITY CHARACTERISTICS – LIMITS AND METHODS OF MEASUREMENT

1 Scope and object

This CISPR publication applies to information technology equipment (ITE) as defined in CISPR 22.

The object of this publication is to establish requirements that will provide an adequate level of intrinsic immunity so that the equipment will operate as intended in its environment. The publication defines the immunity test requirements for equipment within its scope in relation to continuous and transient conducted and radiated disturbances, including electrostatic discharges (ESD).

Procedures are defined for the measurement of ITE and limits are specified which are developed for ITE within the frequency range from 0 Hz to 400 GHz.

For exceptional environmental conditions, special mitigation measures may be required.

Owing to testing and performance assessment considerations, some tests are specified in defined frequency bands or at selected frequencies. Equipment which fulfils the requirements at these frequencies is deemed to fulfil the requirements in the entire frequency range from 0 Hz to 400 GHz for electromagnetic phenomena.

The test requirements are specified for each port considered.

NOTE 1 Safety considerations are not covered in this publication.

NOTE 2 In special cases, situations will arise where the level of disturbance may exceed the levels specified in this publication, for example where a hand-held transmitter is used in proximity to equipment. In these instances, special mitigation measures may have to be employed.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-161:1990, *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility*

IEC 60318-1:2009, *Electroacoustics – Simulators of human head and ear – Part 1: Ear simulator for the measurement of supra-aural and circumaural earphones*

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*
Amendment 1(2007)
Amendment 2(2010)

IEC 61000-4-4:2004, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2005, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6:2008, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8:2009, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

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)

CISPR 20:2006, *Sound and television broadcast receivers and associated equipment – Immunity characteristics – Limits and methods of measurement*

CISPR 22:2008, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-161, and the following apply.

3.1

degradation

unwanted change in operational performance of an EUT due to electromagnetic disturbances. This does not necessarily mean malfunction or catastrophic failure

3.2

equipment under test

EUT

representative device or functionally interactive group of devices (that is a system) which includes one or more host units that is subjected to test procedures specified in this publication

3.3

information technology equipment

ITE

any equipment:

- a) which has a primary function of either (or a combination of) entry, storage, display, retrieval, transmission, processing, switching, or control, of data and of telecommunication messages and which may be equipped with one or more terminal ports typically operated for information transfer;
- b) with a rated supply voltage not exceeding 600 V.

It includes, for example, data processing equipment, office machines, electronic business equipment and telecommunication equipment.

Any equipment (or part of the ITE equipment) which has a primary function of radio transmission and/or reception according to the ITU Radio Regulations are excluded from the scope of this publication.

NOTE Any equipment which has a function of radio transmission and/or reception according to the definitions of the ITU Radio Regulations should fulfil the national radio regulations, whether or not this publication is also valid.

Equipment, for which all disturbance requirements in the frequency range are explicitly formulated in other IEC or CISPR publications, are excluded from the scope of this publication.

[3.1 of CISPR 22:2008]

3.4

jitter (of a cathode ray tube (CRT) monitor)

peak-to-peak variation in the geometric location of picture elements on the viewing surface of the CRT monitor

3.5

port

particular interface of the specified EUT with the external electromagnetic environment (see Figure 1)

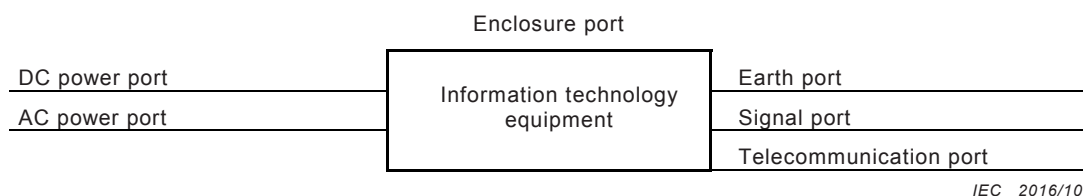


Figure 1 – Description of ports

3.6

enclosure port

physical boundary of the EUT through which electromagnetic fields may radiate or impinge. For plug-in units, the physical boundary will be defined by the host unit

3.7

telephony call

process exercised in the network and the telecommunication terminal equipment (TTE) to allow interchange of information (speech, video or data) with another TTE through the network

NOTE The call should be operated in the way specified by the manufacturer. For circuit switched services, the exchange of data should be considered to be possible when a 64 kbit/s channel or equivalent is available for both parties. For packet service, the exchange of information should be considered to be possible when a virtual path is established to the called TTE.

3.8

establishment of a telephony call

the operating procedure for a user or an automatic process in conjunction with the network to reach the capability to exchange information with another TTE

NOTE See Note of 3.7.

3.9

reception of a telephony call

the operating procedure for a user or an automatic process initiated by, and in conjunction with, the network to reach the capability to exchange information with another TTE

NOTE See Note of 3.7.

3.10

maintenance of a telephony call

the capability of exchanging information without having to clear and re-establish a call

NOTE See Note of 3.7.

3.11

clearing of a telephony call

the operating procedure for a user or an automatic process in conjunction with the network (either at the initiative of the local party or the distant party) to stop the capability of exchanging information by an orderly return to a state where the establishment of a new call is possible

NOTE See Note of 3.7.

3.12

network terminator

NT

associated equipment representing the termination of the telecommunication network

3.13

telephony service

a service providing users with the ability for real-time two-way speech conversation via a network

[see ITU-T, I.241.1]

3.14

telecommunications terminal equipment

TTE

equipment intended to be connected to a public or private telecommunications network, that is:

- a) to be connected directly to the termination of a telecommunications network in order to send, process or receive information; or
- b) to inter-work with a telecommunications network being connected directly or indirectly to the termination of a telecommunications network in order to send, process or receive information

3.15

multifunction equipment

information technology equipment in which two or more functions subject to this standard and/or to other standards are provided in the same unit

NOTE Examples of multifunction equipment include

- a personal computer provided with a telecommunication function and/or broadcast reception function;
- a personal computer provided with a measuring function, etc.

3.16

telecommunication network port

point of connection for voice, data and signaling transfers intended to interconnect widely dispersed systems via such means as direct connection to multi-user telecommunications networks (e.g. public switched telecommunications networks (PSTN), integrated services digital networks (ISDN), x-type digital subscriber lines (xDSL), etc.), local area networks (e.g. Ethernet, Token Ring, etc.) and similar networks

NOTE A port generally intended for interconnection of components of an ITE system under test (e.g. RS-232, IEEE Standard 1284 (parallel printer), Universal Serial Bus (USB), IEEE Standard 1394 ("Fire Wire"), etc.) and used in accordance with its functional specifications (e.g. for the maximum length of cable connected to it), is not considered to be a telecommunications/network port under this definition.

3.17

analogue interface

an interface that transmits and receives signals whose characteristic quantities follow continuously the variations of another physical quantity representing information

3.18

acoustic interface

port at which audio signals emanate and/or originate

3.19

associated equipment

AE

equipment needed to exercise and/or monitor the operation of the EUT in a representative way

4 Immunity test requirements

4.1 General

The immunity test requirements for equipment are given on a port-by-port basis.

Tests shall be conducted in a well-defined and reproducible manner.

The tests shall be carried out as single tests in sequence. The sequence of testing is optional.

The description of the test, the test generator, the test methods and the test set-up are given in IEC basic EMC standards which are referred to in the following tables.

The contents of these IEC basic EMC standards are not repeated here; however, modifications or additional information needed for the practical application of the tests are given in this publication.

4.2 Particular requirements

4.2.1 Electrostatic discharges (ESD)

The test procedure shall be in accordance with IEC 61000-4-2, with the following modifications and clarifications.

Electrostatic discharges shall be applied only to those points and surfaces of the EUT which are expected to be touched during usual operation, including user access, as specified in the user manual, for example cleaning or adding consumables when the EUT is powered.

The number of test points is EUT dependent. The requirements of 8.3.1 and A.5 of IEC 61000-4-2 shall be taken into consideration when selecting test points. The application of discharges to the contacts of open connectors is not required.

Guidance on the selection of actual test points is given in A.5 of IEC 61000-4-2. When selecting test points particular attention shall be given to keyboards, dialing pads, power switches, mice, drive slots, card slots, around communication ports, etc.

The discharges shall be applied in two ways:

a) Contact discharges to the conductive surfaces and to coupling planes:

The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. For table-top equipment one of the test points shall be the centre front edge of the horizontal coupling plane, which shall be subjected to at least 50 indirect discharges (25 of each polarity). All other test points shall each receive at least 50 direct contact discharges (25 of each polarity). All areas normally touched by the user should be tested. If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode (see IEC 61000-4-2 for use of the Vertical Conducting Plane (VCP)).