
Limits and methods of measurement of radio disturbance characteristics of electrical motor-operated and thermal appliances for household and similar purposes, electric tools and similar electric apparatus

Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus -- Part 1: Emission - Product family standard

Elektromagnetische Verträglichkeit - Anforderungen an Haushaltgeräte, Elektrowerkzeuge und ähnliche Elektrogeräte -- Teil 1: Störaussendung - Produktfamilienorm

Compatibilité électromagnétique - Exigences pour les appareils électrodomestiques, outillages électriques et appareils analogues -- Partie 1: Emission - Norme de famille de produits

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ENGLISH VERSION

Limits and methods of measurement of radio disturbance characteristics of electrical motor-operated and thermal appliances for household and similar purposes, electric tools and similar electric apparatus
(CISPR 14:1993)

Limites et méthodes de mesure des perturbations radioélectriques produites par les appareils électrodomestiques ou analogues comportant des moteurs ou des dispositifs thermiques, par les outils électriques et par les appareils électriques analogues
(CISPR 14:1993)

Grenzwerte und Meßverfahren für Funkstörungen von Geräten mit elektromotorischem Antrieb und Elektrowärmegegeräten für den Hausgebrauch und ähnliche Zwecke, Elektrowerkzeugen und ähnlichen Elektrogeräten
(CISPR 14:1993)

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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.

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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

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EN 55014:1993

FOREWORD

The text of documents CISPR/F(CO)70 and 71, as prepared by CISPR, Sub-Committee F: Interference relating to household appliances, tools, lighting equipment and similar apparatus, was submitted to the IEC-CENELEC parallel vote in April 1991.

The text of document CISPR/F(CO)84, prepared by the same Sub-Committee was submitted to the IEC-CENELEC parallel vote in May 1992.

The reference documents were approved by CENELEC as EN 55014 on 9 March 1993.

The following dates were fixed:

- latest date of publication of
an identical national standard (dop) 1993-11-01
- latest date of withdrawal of
conflicting national standards (dow) 1995-12-31

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ENDORSEMENT NOTICE

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The text of the International Standard CISPR 14:1993 was approved by CENELEC as a European Standard without any modification.

COMMISSION
ÉLECTROTECHNIQUE
INTERNATIONALE
INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

CISPR 14

Troisième édition
Third edition
1993-01

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

**Limites et méthodes de mesure des perturbations
radioélectriques produites par les appareils
électrodomestiques ou analogues comportant
des moteurs ou des dispositifs thermiques, par
les outils électriques et par les appareils
électriques analogues**

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**Limits and methods of measurement of radio
disturbance characteristics of electrical motor-
operated and thermal appliances for household
and similar purposes, electric tools and
electric apparatus**



Numéro de référence
Reference number
CISPR 14: 1993

Révision de la présente publication

Le contenu technique des publications de la CEI et du C.I.S.P.R. est constamment revu par la Commission et par le C.I.S.P.R., afin d'assurer qu'il reflète bien l'état actuel de la technique.

Les renseignements relatifs à ce travail de révision, à l'établissement des éditions révisées et aux mises à jour peuvent être obtenus auprès des Comités nationaux de la CEI et en consultant les documents ci-dessous:

- Bulletin de la CEI
- Annuaire de la CEI
- Catalogue des publications de la CEI
Publié annuellement

Terminologie utilisée dans la présente publication

Seuls sont définis ici les termes spéciaux se rapportant à la présente publication.

En ce qui concerne la terminologie générale, le lecteur se reportera à la Publication 50 de la CEI: Vocabulaire Electrotechnique International (VEI), qui est établie sous forme de chapitres séparés traitant chacun d'un sujet défini, l'Index général étant publié séparément. Des détails complets sur le VEI peuvent être obtenus sur demande.

Pour les termes concernant les perturbations radio-électriques, voir le chapitre 902.

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Symboles graphiques et littéraux

Pour les symboles graphiques, symboles littéraux et signes d'usage général approuvés par la CEI, le lecteur consultera:

- la Publication 27 de la CEI: Symboles littéraux à utiliser en électrotechnique;
- la Publication 617 de la CEI: Symboles graphiques pour schémas.

Les symboles et signes contenus dans la présente publication ont été soit repris des Publications 27 ou 617 de la CEI, soit spécifiquement approuvés aux fins de cette publication.

Publications du C.I.S.P.R.

L'attention du lecteur est attirée sur les pages 3 et 4 de la couverture, qui énumère les publications du C.I.S.P.R.

Revision of this publication

The technical content of IEC and C.I.S.P.R. publications is kept under constant review by the IEC and C.I.S.P.R., thus ensuring that the content reflects current technology.

Information on the work of revision, the issue of revised editions and amendment sheets may be obtained from IEC National Committees and from the following IEC sources:

- IEC Bulletin
- IEC Yearbook
- Catalogue of IEC Publications
Published yearly

Terminology used in this publication

Only special terms required for the purpose of this publication are defined herein.

For general terminology, readers are referred to IEC Publication 50: International Electrotechnical Vocabulary (IEV), which is issued in the form of separate chapters each dealing with a specific field, the General Index being published as a separate booklet. Full details of the IEV will be supplied on request.

For terms on radio interference, see Chapter 902.

Graphical and letter symbols

For graphical symbols, and letter symbols and signs approved by the IEC for general use, readers are referred to:

- IEC Publication 27: Letter symbols to be used in electrical technology;
- IEC Publication 617: Graphical symbols for diagrams.

The symbols and signs contained in the present publication have either been taken from IEC Publications 27 or 617, or have been specifically approved for the purpose of this publication.

C.I.S.P.R. publications

The attention of readers is drawn to pages 3 and 4 of the cover, which list C.I.S.P.R. publications

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INTERNATIONAL ELECTROTECHNICAL COMMISSION
INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

**LIMITS AND METHODS OF MEASUREMENT OF RADIO DISTURBANCE
CHARACTERISTICS OF ELECTRICAL MOTOR-OPERATED AND
THERMAL APPLIANCES FOR HOUSEHOLD AND SIMILAR PURPOSES,
ELECTRIC TOOLS AND SIMILAR ELECTRIC APPARATUS**

FOREWORD

- 1) The formal decisions of agreements of the CISPR on technical matters, prepared by Sub-Committees on which all the National Committees and other Member Organizations of the CISPR having a special interest therein are represented, express, as nearly as possible, an international consensus on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees and other Member Organizations of the CISPR in that sense.
- 3) In order to promote international unification, the CISPR expresses the wish that all National Committees should adopt the text of the CISPR recommendations for their national rules in so far as national conditions will permit. Any divergence between the CISPR recommendations and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

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This publication has been prepared by CISPR, Sub-Committee F: Interference relating to household appliances, tools, lighting equipment and similar apparatus.

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The third edition replaces the second edition, published in 1985 and Amendment No. 2 (1989) (which includes Amendment No. 1) and Amendment No. 3 (1990).

The changes are based on the following documents:

Six Months' Rule	Reports on Voting
CISPR/F(CO)70 and 71 CISPR/F(CO)84	CISPR/F(CO)81 and 82 CISPR/F(CO)87

Full information on the voting for the approval of this CISPR publication can be found in the voting reports indicated in the above table.

The main changes are the integration of the amendments into the main text which required a redesign of the clauses to arrive at a more logic sequence of the subjects.

The scope is extended to the whole radio frequency range from 9 kHz to 400 GHz, but limits are formulated only in restricted frequency bands which is considered sufficient to reach adequate emission levels to protect radio broadcast and telecommunication services and to allow other apparatus to operate as intended at reasonable distance.

INTRODUCTION

The intention of this standard is to establish uniform requirements for the radio disturbance level of the equipment contained in the scope, to fix limits of disturbance, to describe methods of measurement and to standardize operating conditions and interpretation of results.

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LIMITS AND METHODS OF MEASUREMENT OF RADIO DISTURBANCE CHARACTERISTICS OF ELECTRICAL MOTOR-OPERATED AND THERMAL APPLIANCES FOR HOUSEHOLD AND SIMILAR PURPOSES, ELECTRIC TOOLS AND SIMILAR ELECTRIC APPARATUS

1 Scope

1.1 This standard applies to the conduction and the radiation of radio-frequency disturbances from appliances whose main functions are performed by motors and switching or regulating devices, unless the r.f. energy is intentionally generated or intended for illumination.

It includes such equipment as: household electrical appliances, electric tools, regulating controls using semiconductor devices, motor-driven electro-medical apparatus, electric toys, automatic dispensing machines as well as cine or slide projectors.

Also included in the scope of this standard are:

- separate parts of the above mentioned equipment such as motors, switching devices e.g. (power or protective) relays, however no emission requirements apply unless formulated in this standard.

This standard gives for the time being no requirements for apparatus that cannot be measured on a test site; requirements for *in situ* measurements are under consideration.

Requirements concerning immunity are under consideration.

Excluded from the scope of this standard are:

- apparatus for which all emission requirements in the radio frequency range are explicitly formulated in other IEC or CISPR standards;

NOTE - Examples are:

- *Luminaires, discharge lamps and other lighting devices*: CISPR 15;
- *Audio and video equipment and electronic music instruments*: CISPR 13 and 20 (see also 7.3.5.4.2);
- *Mains communication devices*: IEC XX (to be published);
- *Equipment for generating and use of radio frequency energy for heating and therapeutic purposes*: CISPR 11;
- *Microwave ovens*: CISPR 11 (but be aware of subclause 1.3 on multifunction equipment);
- *Information technology equipment, e.g. home computers, personal computers*: CISPR 22;
- *Electric equipment to be used on motor vehicles*: CISPR 12.
- regulating controls and equipment with regulating controls incorporating semiconductor devices with a rated input current of more than 25 A per phase;
- stand-alone power supplies.

1.2 The frequency range covered is 9 kHz to 400 GHz.

1.3 Multifunction equipment which is subjected simultaneously to different clauses of this standard and/or other standards shall meet the provisions of each clause/standard with the relevant functions in operation; details are given in 7.2.1.

1.4 The limits in this standard have been determined on a probabilistic basis, to keep the suppression of disturbances economically feasible while still achieving an adequate radio protection. In exceptional cases radio frequency interference may occur, in spite of compliance with the limits. In such a case, additional provisions may be required.

2 Normative references

The following standards are referred to in this publication:

IEC 50(161): 1989, *International Electrotechnical Vocabulary – Chapter 161: Electromagnetic Compatibility*

CISPR 16: 1987, *CISPR Specification for radio interference measuring apparatus and measuring methods*

CISPR 16-1: *Specification for radio interference and immunity measuring equipment, Part 1 (Draft 1989)*

CISPR 16-2: *Methods of interference and immunity measurements, Part 2 (Draft 1989)*

NOTE - CISPR 16 (1987) shall be used until CISPR 16-1 and CISPR 16-2 are available.

3 Definitions

3.1.1 For the purpose of this standard, the definitions contained in IEC 50(161): 1989, *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic Compatibility*, apply extended with the specific definitions in the field of discontinuous disturbance given in 3.2 to 3.7.

3.1.2 Definitions of the following terms are specified in CISPR 16, Part 1 and Part 2 (Draft 1989):

Asymmetric voltage	Reference ground
Electrical charge time constant	RFD current
Electrical discharge time constant	RFD power on conductors
Equipment under test (EUT)	RFD voltage
Level	Type testing
Radio frequency disturbance source	Weighting

3.2 click: A disturbance which exceeds the limit of continuous disturbance not longer than 200 ms and which is separated from a subsequent disturbance by at least 200 ms. Both intervals are related to the level of the limit of continuous disturbance.

A click may contain a number of impulses; in which case the relevant time is that from the beginning of the first to the end of the last impulse (see figure 3).

3.3 switching operation: One opening or one closing of a switch or contact.

NOTE - Independent of whether clicks are observed or not.

3.4 minimum observation time T : The minimum time necessary when counting clicks (or where relevant counting switching operations) to provide sufficiently firm evidence for the statistical interpretation of the number of clicks (or switching operations) per time unit (see also 7.4.2.1).

3.5 click rate N : In general the number of clicks or switching operations within one minute; this figure is being used to determine the click limit (see also 7.4.2.3).

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3.6 click limit L_q : The relevant limit L for continuous disturbance, as given in 4.1.1 for the measurement with the quasi-peak detector, increased by a certain value determined from the click rate N (see also 4.2.2.2).

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The click limit applies to the disturbance assessed according to the upper quartile method.

3.7 upper quartile method: A quarter of the number of the clicks registered during the observation time T is allowed to exceed the click limit L_q .

In the case of switching operations a quarter of the number of the switching operations registered during the observation time is allowed to produce clicks exceeding the click limit L_q (see also 7.4.2.6).

4 Limits of disturbance

Radio disturbance measurements below 148,5 kHz and above 300 MHz need not to be carried out, unless otherwise specified in this standard for specific appliances.

4.1 Continuous disturbance

Commutator motors, as well as other devices incorporated in household appliances, electric tools and similar electrical apparatus may cause continuous disturbance.

Continuous disturbance may be either broadband, caused by switching devices such as mechanical switches, commutators and semiconductor regulators, or may be narrowband, caused by electronic control devices such as microprocessors.

NOTE - Instead of the concept of "broadband" and "narrowband" disturbances, in this standard a distinction is made between two related kinds of disturbance, defined by the type of the applied detector. For this purpose limits have been defined with respect to the measurement with the quasi-peak detector and with the average detector (see 5.1.1 and 6.1.1).

4.1.1 Frequency range 148,5 kHz to 30 MHz (terminal voltages)

NOTE - The World Administrative Radiocommunications Conference (WARC) has in 1979 reduced the lower frequency limit in Region 1 to 148,5 kHz; for applications falling in the scope of this standard, tests at 150 kHz are considered adequate, since 148,5 kHz falls within the receiver bandwidth.

The limits of the terminal disturbance voltages are given in table 1. Terminal voltages are measured, in accordance with clause 5, on each terminal with respect to ground.

Terminals are defined as conductive parts, suitable for re-usable electrical connection to external circuits.

4.1.1.1 The limits in columns 2 and 3 shall be met on the phase(s) and the neutral of the mains terminals of all appliances except those of electric tools.

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4.1.1.2 On additional terminals of appliances as well as on load and additional terminals of regulating controls incorporating semiconductor devices the relaxed limits given for "additional terminals" in columns 4 and 5 apply.

Terminals which may be used as either mains terminals or load/additional terminals are subject to the limits for mains terminals.

No terminal voltage limits apply for non-rewirable leads shorter than 2 m, connecting separate semiconductor speed controls with apparatus such as sewing machines, dental drills, etc. The semiconductor device may be either incorporated in the separate control unit or in the apparatus.

NOTE - For the measurement at the load terminals and additional terminals of regulating controls incorporating semiconductor devices see 5.2.4, for additional terminals of other appliances see 5.2.3.

4.1.1.3 For the mains terminals of electric tools the particular limits given in columns 6 to 11 apply according to the rated power of the motor, the power of any heating device is to be excluded (for instance heating power in a blower for plastic welding). For the load terminals and additional terminals of electric tools, columns 4 and 5 apply without further relaxation.