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Edition 4:2000 consolidated with amendments 1:2001 and 2:2002

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus –

Part 1: Emission

*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.*

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Part 1: Emission

FOREWORD

1) The formal decisions or agreements of the CISPR on technical matters, prepared by subcommittees 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.

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

It has the status of a product family EMC publication in accordance with IEC Guide 107.

This consolidated version of CISPR 14-1 is based on the fourth edition (2000) [documents CISPR/F/300/FDIS and CISPR/F/306/RVD], its amendment 1 (2001) [documents CISPR/F/332/FDIS and CISPR/F/339/RVD and its amendment 2 (2002) [documents CISPR/F/355/FDIS and CISPR/F/361/RVD].

It bears the edition number 4.2.

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

Annex A forms an integral part of this CISPR publication.

Annexes B and C are for information only.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until 2004. At this date, the publication will be

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- withdrawn;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

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.

ELECTROMAGNETIC COMPATIBILITY – REQUIREMENTS FOR HOUSEHOLD APPLIANCES, ELECTRIC TOOLS AND SIMILAR APPARATUS –

Part 1: Emission

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/electronic 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.

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 1 Examples are:

– luminaires, including portable child-appealing luminaires, discharge lamps and other lighting devices: CISPR 15;
– audio and video equipment and electronic music instruments, other than toys: CISPR 13 and CISPR 20 (see also 7.3.5.4.2);
– mains communication devices, as well as baby surveillance systems: IEC 61000-3-8;
– equipment for generation and use of radio frequency energy for heating and therapeutic purposes: CISPR 11;
– microwave ovens: CISPR 11 (but be aware of 1.3 on multifunction equipment);
– information technology equipment, e.g. home computers, personal computers, electronic copying machines: CISPR 22;
– electronic equipment to be used on motor vehicles: CISPR 12;
– radio controls, walkie-talkies and other types of radio-transmitters, also when used with toys.

– 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.

NOTE 2 Toys powered by the supply system of a motor-powered vehicle, ship or aircraft are not covered by this standard.

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.

1.5 The effects of electromagnetic phenomena relating to the safety of apparatus are excluded from the scope of this standard.

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.

The following standards are referred to in this publication:

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

IEC 60335-2-76:1997, *Safety of household and similar electrical appliances – Part 2: Particular requirements for electric fence energizers*

CISPR 16-1:1993, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1: Radio disturbance and immunity measuring apparatus*
Amendment 1 (1997)*

CISPR 16-2:1996, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2: Methods of measurement of disturbances and immunity*
Amendment 1 (1999)**

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

IEC 60598-2-10:1987, *Luminaires – Part 2: Particular requirements – Section 10: Portable child-appealing luminaires*

* A consolidated edition has been issued in 1998.

** A consolidated edition has been issued in 1999.

3 Definitions

For the purpose of this standard, the definitions contained in IEC 60050(161):1990, *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility,* apply extended with the specific definitions as follows:

3.1 Definitions of the following terms are specified in CISPR 16-1 and CISPR 16-2:

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, the amplitude of which exceeds the quasi-peak limit of continuous disturbance, the duration of which is not longer than 200 ms and which is separated from a subsequent disturbance by at least 200 ms. The durations are determined from the signal which exceeds the i.f. reference level of the measuring receiver

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.

NOTE Under certain conditions, some kinds of disturbances are exempted from this definition (see 4.2.3)

3.3
i.f. reference level
the corresponding value on the intermediate frequency output of the measuring receiver of an unmodulated sinusoidal signal which produces a quasi-peak indication equal to the limit for continuous disturbance

3.4
switching operation
one opening or one closing of a switch or contact

NOTE Independent of whether clicks are observed or not.

3.5
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)

3.6
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)

3.7
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)

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

3.8
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).

3.9
toy
product designed for, or clearly intended for use in play by children under 14 years old.

Toys may incorporate motors, heating elements, electronic circuits and their combination.

The supply voltage of a toy shall not exceed 24 V a.c. (r.m.s) or ripple-free d.c. and may be provided by a battery or by means of an adapter or a safety transformer connected to the mains supply

NOTE Transformers, converters and chargers for toys are considered not to be part of the toy (see IEC 61558-2-7).

3.10
battery toy
toy which contains or uses one or more batteries as the only source of electrical energy

3.11
transformer toy
toy which is connected to the supply mains through a transformer for toys and using the supply mains as the only source of electrical energy

3.12
dual supply toy
toy which can be operated simultaneously or alternatively as a battery toy and a transformer toy

3.13
battery box
compartment which is separate from the toy and in which the batteries are placed

3.14
safety isolating transformer
transformer, the input winding of which is electrically separated from the output winding by an insulation at least equivalent to double insulation or reinforced insulation, and which is designed to supply an appliance or circuit at safety extra-low voltage

3.15
safety transformer for toys
safety isolating transformer specially designed to supply toys operating at safety extra-low voltage not exceeding 24 V

NOTE Either a.c. or d.c. or both may be delivered from the transformer unit.

3.16
constructional kit
collection of electric, electronic or mechanical parts intended to be assembled as various toys

3.17
experimental kit
collection of electric or electronic components intended to be assembled in various combinations

NOTE The main aim of an experimental set is to facilitate the acquiring of knowledge by experiment and research. It is not intended to create a toy or equipment for practical use.

3.18
functional toy
toy with a rated voltage not exceeding 24 V and which is a model of an appliance or installation used by adults

NOTE A product with a rated voltage exceeding 24 V, intended to be used by children under the direct supervision of an adult and which is a model of an appliance or installation and used in the same way, is known as a functional product.

3.19
portable child-appealing luminaire
a luminaire that in normal use can be moved from one place to another while connected to the supply, and which is constructed to represent a model, person or animal such that due to the design and materials used it could be treated, by a child, as a toy

[IEC 60598-2-10:1987, 10.3, definition 1)]

3.20
video toy
toy consisting of a screen and activating means by which the child can play and interact with the picture shown on the screen

NOTE All parts necessary for the operation of the video toy, such as control box, joy stick, keyboard, monitor and connections, are considered to be part of the toy.

3.21
electronic circuit
circuit incorporating at least one electronic component

3.22
electronic component
part in which conduction is achieved principally by electrons moving through a vacuum, gas or semiconductor

NOTE Electronic components do not include resistors, capacitors and inductors.

3.23
normal operation of toys
condition under which the toy, connected to the recommended power supply, is played with as intended or in a foreseeable way, bearing in mind the normal behaviour of children

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.

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 leads, which are not easily extensible by the user (permanently connected, or provided with a specific connector), which are shorter than 2 m, and which connect the equipment with an auxiliary apparatus or device, (e.g. semiconductor speed controls, powerplugs with AC-DC converters).

No terminal voltage limits apply to leads integrated in the suction hose of vacuum cleaners, even if the length exceeds 2 m.

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.

Table 1 – Terminal voltage limits for the frequency range 148,5 kHz to 30 MHz
(see figures 1 and 2)

HOUSEHOLD APPLIANCES AND EQUIPMENT CAUSING SIMILAR DISTURBANCES
AND REGULATING CONTROLS INCORPORATING SEMICONDUCTOR DEVICES

Frequency range	**At mains terminals**		**At load terminals and additional terminals**	
1	**2**	**3**	**4**	**5**
(MHz)	dB (μV) Quasi-peak	dB (μV) Average*	dB (μV) Quasi-peak	dB (μV) Average*
0,15 to 0,50	Decreasing linearly with the logarithm of the frequency from:		80	70
	66 to 56	59 to 46		
0,50 to 5	56	46	74	64
5 to 30	60	50	74	64

MAINS TERMINALS OF TOOLS

1	**6**	**7**	**8**	**9**	**10**	**11**
Frequency range	**Rated motor power not exceeding 700 W**		**Rated motor power above 700 W and not exceeding 1 000 W**		**Rated motor power above 1 000 W**	
(MHz)	dB (μV) Quasi-peak	dB (μV) Average*	dB (μV) Quasi-peak	dB (μV) Average*	dB (μV) Quasi-peak	dB (μV) Average*
0,15 to 0,35	Decreasing linearly with the logarithm of the frequency from:					
	66 to 59	59 to 49	70 to 63	63 to 53	76 to 69	69 to 59
0,35 to 5	59	49	63	53	69	59
5 to 30	64	54	68	58	74	64

* If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

NOTE The limits for the measurement with the average detector are tentative and may be modified after a period of experience.

4.1.1.4 Limits for electric fence energizers apply to

a) the fence terminals on all energizers (columns 4 and 5 of table 1);

b) the mains terminals on energizers designed for connection to the mains (columns 2 and 3 of table 1);

c) the battery terminals on energizers designed for operation from a battery (columns 4 and 5 of table 1).