

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

COMITÉ INTERNATIONAL SPÉCIAL DES PERTURBATIONS RADIOÉLECTRIQUES

**Industrial, scientific and medical equipment – Radio-frequency disturbance  
characteristics – Limits and methods of measurement**

**Appareils industriels, scientifiques et médicaux – Caractéristiques de  
perturbations radioélectriques – Limites et méthodes de mesure**



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IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
Web: [www.iec.ch](http://www.iec.ch)

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Email: [csc@iec.ch](mailto:csc@iec.ch)

Tél.: +41 22 919 02 11

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

**INDUSTRIAL, SCIENTIFIC AND MEDICAL EQUIPMENT –  
RADIO-FREQUENCY DISTURBANCE CHARACTERISTICS –  
LIMITS AND METHODS OF MEASUREMENT**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard CISPR 11 has been prepared by CISPR Subcommittee B: Interference relating to industrial, scientific and medical radio-frequency apparatus, to other (heavy) industrial equipment, to overhead power lines, to high voltage equipment and to electric traction.

This fifth edition of CISPR 11 cancels and replaces the fourth edition published in 2003, its Amendment 1 (2004) and Amendment 2 (2006). It constitutes a technical revision.

This fifth edition of CISPR 11 got a more transparent structure, introduces another set of particular limits for conducted and radiated disturbances of "heavy duty" general purpose equipment of class A group 1 with a rated input power in excess of 20 kVA, in accordance with the needs of the industries and refers to the full approach in respect of the measurement instrumentation uncertainty specified in CISPR 16-4-4. Furthermore, any kind of "legal statements" were removed from the normative main body of this International Standard.

It has the status of a Product Family EMC standard in accordance with IEC Guide 107, *Electromagnetic compatibility – Guide to the drafting of electromagnetic compatibility publications* (2009).

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

FDIS	Report on voting
CISPR/B/478/FDIS	CISPR/B/482/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

The main content of this standard is based on CISPR Recommendation No. 39/2 given below:

RECOMMENDATION No. 39/2

**Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment**

The CISPR

CONSIDERING

- a) that ISM RF equipment is an important source of disturbance;
- b) that methods of measuring such disturbances have been prescribed by the CISPR;
- c) that certain frequencies are designated by the International Telecommunication Union (ITU) for unrestricted radiation from ISM equipment,

RECOMMENDS

that the latest edition of CISPR 11 be used for the application of limits and methods of measurement of ISM equipment.

## INTRODUCTION

This CISPR publication contains, amongst common requirements for the control of RF disturbances from equipment intended for use in industrial, scientific, and medical (ISM) electrical applications, specific requirements for the control of RF disturbances caused by ISM RF applications in the meaning of the definition of the International Telecommunication Union (ITU), see also Definition 3.1 in this International Standard. CISPR and ITU share their responsibility for the protection of radio services in respect of the use of ISM RF applications.

The CISPR is concerned with the control of RF disturbances from ISM RF applications by means of an assessment of these disturbances, either at a standardised test site or, for an individual ISM RF application which cannot be tested at such a site, at its place of operation. Consequently, this CISPR publication covers requirements for conformity assessment of both, equipment assessed by means of type tests at standardised test sites or of individual equipment under *in situ* conditions.

The ITU is concerned with the control of RF disturbances from ISM RF applications during normal operation and use of the respective equipment at its place of operation. There, use of radio-frequency energy decoupled from the ISM RF application by radiation, induction or capacitive coupling is restricted to the location of that individual application.

This CISPR publication contains, in 6.2 and 6.3, the essential emission requirements for an assessment of RF disturbances from ISM RF applications at standardised test sites. These requirements allow for type testing of ISM RF applications operated at frequencies up to 18 GHz. It further contains, in 6.4, the essential emission requirements for an *in situ* assessment of RF disturbances from individual ISM RF applications in the frequency range up to 18 GHz. All requirements were established in close collaboration with the ITU and enjoy approval of the ITU.

However, for operation and use of several types of ISM RF applications, the manufacturer, installer and/or customer should be aware of additional national provisions regarding possible licensing and particular protection needs of local radio services and applications. Depending on the country concerned, such additional provisions may apply to individual ISM RF applications operated at frequencies outside designated ISM bands (see Table 1). They also may apply to ISM RF applications operated at frequencies above 18 GHz. For the latter type of applications, local protection of radio services and appliances requires an accomplishment of the conformity assessment by application of the relevant national provisions in the frequency range above 18 GHz in accordance with vested interests of the ITU and national administrations. These additional national provisions may apply to spurious emissions, emissions appearing at harmonics of the operation frequency, and to wanted emissions at the operation frequency allocated outside a designated ISM band in the frequency range above 18 GHz.

Recommendations of CISPR for the protection of radio services in particular areas are found in Annex E of this International Standard.

# **INDUSTRIAL, SCIENTIFIC AND MEDICAL EQUIPMENT – RADIO-FREQUENCY DISTURBANCE CHARACTERISTICS – LIMITS AND METHODS OF MEASUREMENT**

## **1 Scope**

This International Standard applies to industrial, scientific and medical electrical equipment operating in the frequency range 0 Hz to 400 GHz and to domestic and similar appliances designed to generate and/or use locally radio-frequency energy.

This standard covers emission requirements related to radio-frequency (RF) disturbances in the frequency range of 9 kHz to 400 GHz. Measurements need only be performed in frequency ranges where limits are specified in Clause 6.

For ISM RF applications in the meaning of the definition found in the ITU Radio Regulations (see Definition 3.1), this standard covers emission requirements related to radio-frequency disturbances in the frequency range of 9 kHz to 18 GHz.

Requirements for ISM RF lighting apparatus and UV irradiators operating at frequencies within the ISM frequency bands defined by the ITU Radio Regulations are contained in this standard.

Equipment covered by other CISPR product and product family emission standards 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.

CISPR 16-1-1:2006, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus*

Amendment 1 (2006)

Amendment 2 (2007)

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 16-1-4:2007, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-4: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Radiated disturbances*

Amendment 1 (2007)

Amendment 2 (2008)

CISPR 16-2-3:2006, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements*

CISPR 16-4-2:2003, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements*

IEC 60050-161:1990, *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility*  
Amendment 1 (1990)  
Amendment 2 (1998)

IEC 60601-1-2:2007, *Medical electrical equipment – Part 1-2: General requirements for basic safety and essential performance – Collateral standard: Electromagnetic compatibility – Requirements and tests*

IEC 60601-2-2:2009, *Medical electrical equipment – Part 2-2: Particular requirements for the basic safety and essential performance of high frequency surgical equipment and high frequency surgical accessories*

IEC 60974-10:2007, *Arc welding equipment – Part 10: Electromagnetic compatibility (EMC) requirements*

IEC 61307:2006, *Industrial microwave heating installations – Test methods for the determination of power output*

IEC 62135-2:2007, *Resistance welding equipment – Part 2: Electromagnetic compatibility (EMC) requirements*

ITU Radio Regulations (2008), *Radio regulations, Volume 3 – Resolutions and recommendations, resolution no. 63*

### 3 Terms and definitions

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

#### 3.1

##### **industrial, scientific and medical (ISM) applications (of radio frequency energy)**

operation of equipment or appliances designed to generate and use locally radio frequency energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of telecommunications

[ITU Radio Regulations Volume 1: 2004 – Articles, Definition 1.15]

NOTE 1 Typical applications are the production of physical, biological, or chemical effects such as heating, ionisation of gases, mechanical vibrations, hair removal, acceleration of charged particles. A non-exhaustive list of examples is given in Annex A.

NOTE 2 The abbreviation ISM RF is used throughout this standard for such equipment or appliances.

#### 3.2

##### **ISM equipment and appliances**

equipment or appliances designed to generate and/or use locally radio-frequency energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of telecommunications and information technology and other applications covered by other CISPR publications