

Electromagnetic compatibility (EMC) - Part 4-7: Testing and measurement techniques - General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto (IEC 61000-4-7:2002)

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EUROPEAN STANDARD

**EN 61000-4-7**

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2002

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Supersedes EN 61000-4-7:1993

English version

**Electromagnetic compatibility (EMC)  
Part 4-7: Testing and measurement techniques -  
General guide on harmonics and interharmonics  
measurements and instrumentation,  
for power supply systems and equipment connected thereto  
(IEC 61000-4-7:2002)**

Compatibilité électromagnétique (CEM)  
Partie 4-7: Techniques d'essai  
et de mesure -  
Guide général relatif aux mesures  
d'harmoniques et d'interharmoniques,  
ainsi qu'à l'appareillage de mesure,  
applicable aux réseaux d'alimentation  
et aux appareils qui y sont raccordés  
(CEI 61000-4-7:2002)

Elektromagnetische Verträglichkeit (EMV)  
Teil 4-7: Prüf- und Messverfahren -  
Allgemeiner Leitfadens für Verfahren  
und Geräte zur Messung  
von Oberschwingungen und  
Zwischenharmonischen in  
Stromversorgungsnetzen und  
angeschlossenen Geräten  
(IEC 61000-4-7:2002)

This European Standard was approved by CENELEC on 2002-10-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard 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 Central Secretariat or to any CENELEC member.

This European Standard 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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

**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**

## Foreword

The text of document 77A/382/FDIS, future edition 2 of IEC 61000-4-7, prepared by SC 77A, Low frequency phenomena, of IEC TC 77, Electromagnetic compatibility, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61000-4-7 on 2002-10-01.

This European Standard supersedes EN 61000-4-7:1993.

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) 2003-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2005-10-01

Annexes designated "normative" are part of the body of the standard.  
Annexes designated "informative" are given for information only.  
In this standard, annex ZA is normative and annexes A, B and C are informative.  
Annex ZA has been added by CENELEC.

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## iTeh STANDARD PREVIEW Endorsement notice (standards.iteh.ai)

The text of the International Standard IEC 61000-4-7:2002 was approved by CENELEC as a European Standard without any modification.

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

- |                      |      |  |
|----------------------|------|--|
| IEC 61000-3 (Series) | NOTE | Partly harmonized in EN 61000-3 series (not modified). |
| IEC 61010-1          | NOTE | Harmonized as EN 61010-1:2001 (not modified).          |
-

## Annex ZA (normative)

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

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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	- <sup>1)</sup>	International Electrotechnical Vocabulary (IEV) Chapter 161: Electromagnetic compatibility	-	-
IEC 61000-3-2	- <sup>1)</sup>	Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)	EN 61000-3-2	2000 <sup>2)</sup>
IEC 61967-1	- <sup>1)</sup>	Integrated circuits - Measurement of electromagnetic emissions, 150 kHz to 1 GHz Part 1: General conditions and definitions	EN 61967-1	2002 <sup>2)</sup>

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<sup>1)</sup> Undated reference.

<sup>2)</sup> Valid edition at date of issue.

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# INTERNATIONAL STANDARD

# IEC 61000-4-7

Second edition  
2002-08

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BASIC EMC PUBLICATION

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## Electromagnetic compatibility (EMC) –

### Part 4-7:

### Testing and measurement techniques –

### General guide on harmonics and interharmonics

### measurements and instrumentation, for power

### supply systems and equipment connected thereto

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTROMAGNETIC COMPATIBILITY (EMC) –****Part 4-7: Testing and measurement techniques –  
General guide on harmonics and interharmonics measurements and  
instrumentation, for power supply systems and  
equipment connected thereto**

## FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter. <http://standards.iteh.ai/catalog/standards/sist/f432adb-67e9-463c-85f4-3662d4d404e/sist-en-61000-4-7-2003>
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61000-4-7 has been prepared by subcommittee 77A: Low frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

This standard forms part 4-7 of IEC 61000. It has the status of a basic EMC publication in accordance with IEC Guide 107.

This second edition cancels and replaces the first edition published in 1991, and constitutes a technical revision.

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

FDIS	Report on voting
77A/382/FDIS	77A/387/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 3.

Annexes A, B and C are for information only.

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

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

The contents of the corrigendum of July 2004 have been included in this copy.

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## INTRODUCTION

IEC 61000 is published in separate parts, according to the following structure:

### **Part 1: General**

General considerations (introduction, fundamental principles)  
Definitions, terminology

### **Part 2: Environment**

Description of the environment  
Classification of the environment  
Compatibility levels

### **Part 3: Limits**

Emission limits  
Immunity limits (in so far as they do not fall under the responsibility of the product committees)

### **Part 4: Testing and measurement techniques**

Measurement techniques  
Testing techniques

### **Part 5: Installation and mitigation guidelines**

Installation guidelines  
Mitigation methods and devices

### **Part 6: Generic standards**

### **Part 9: Miscellaneous**

Each part is further subdivided into several parts, published either as International Standards or as technical specifications or technical reports, some of which have already been published as sections. Other will be published with the part number followed by a dash and a second number identifying the subdivision (example: 61000-6-1).

These publications will be published in chronological order and numbered accordingly.

This part is an International Standard for the measurement of harmonic currents and voltages in power supply systems and harmonic currents emitted by equipment. It also specifies the performance of a standard measuring instrument.

## ELECTROMAGNETIC COMPATIBILITY (EMC) –

### Part 4-7: Testing and measurement techniques – General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto

#### 1 Scope

This part of IEC 61000 is applicable to instrumentation intended for measuring spectral components in the frequency range up to 9 kHz which are superimposed on the fundamental of the power supply systems at 50 Hz and 60 Hz. For practical considerations, this standard distinguishes between harmonics, interharmonics and other components above the harmonic frequency range, up to 9 kHz.

This standard defines the measurement instrumentation intended for testing individual items of equipment in accordance with emission limits given in certain standards (for example, harmonic current limits as given in IEC 61000-3-2) as well as for the measurement of harmonic currents and voltages in actual supply systems. Instrumentation for measurements above the harmonic frequency range, up to 9 kHz is tentatively defined (see Annex B).

NOTE 1 This document deals in detail with instruments based on the discrete Fourier transform.

NOTE 2 The description of the functions and structure of the measuring instruments in this standard is very explicit and meant to be taken literally. This is due to the necessity of having reference instruments with reproducible results irrespective of the characteristics of the input signals.

NOTE 3 The instrument is defined to accommodate measurements of harmonics up to the 50th order.

#### 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, *International Electrotechnical Vocabulary – Chapter 161: Electromagnetic compatibility*

IEC 61000-3-2, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current  $\leq 16$  A per phase)*

IEC 61967-1, *Integrated circuits – Measurement of electromagnetic emissions, 150 kHz to 1 GHz – Part 1: Measurement conditions and definitions*<sup>1</sup>

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<sup>1</sup> To be published