
Electromagnetic compatibility (EMC) - Part 5-7: Installation and mitigation guidelines - Degrees of protection by enclosures against electromagnetic disturbances (EM code) (IEC 61000-5-7:2001)

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EUROPEAN STANDARD

EN 61000-5-7

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2001

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English version

**Electromagnetic compatibility (EMC)
Part 5-7: Installation and mitigation guidelines -
Degrees of protection by enclosures
against electromagnetic disturbances (EM code)
(IEC 61000-5-7:2001)**

Compatibilité électromagnétique (CEM)
Partie 5-7: Guide d'installation et
d'atténuation -
Degrés de protection procurés par les
enveloppes contre les perturbations
électromagnétiques (Code EM)
(CEI 61000-5-7:2001)

Elektromagnetische Verträglichkeit (EMV)
Teil 5-7: Installationsrichtlinien und
Abhilfemaßnahmen -
Schutzarten durch Gehäuse gegen
elektromagnetische Störgrößen
(EM-Code)
(IEC 61000-5-7:2001)

[SIST EN 61000-5-7:2002](http://standards.iteh.ai/catalog/standards/sist/en-61000-5-7-2002)

This European Standard was approved by CENELEC on 2001-01-01. 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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, 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 77C/96/FDIS, future edition 1 of IEC 61000-5-7, prepared by SC 77C, High power transient phenomena, of IEC TC 77, Electromagnetic compatibility, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61000-5-7 on 2001-01-01.

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) 2001-11-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2004-01-01

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 to D are informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61000-5-7:2001 was approved by CENELEC as a European Standard without any modification.

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

IEC 60297-1	https://standards.iteh.ai/catalog/standards/sist-en-61000-5-7-2002 NOTE: Harmonized as HD 493.1 S1:1988 (not modified).
IEC 60297-2	NOTE: Harmonized as HD 493.2 S1:1988 (not modified).
IEC 60297-3	NOTE: Harmonized as HD 493.3 S1:1988 (not modified).
IEC 60297-4	NOTE: Harmonized as EN 60297-4:1995 (not modified).
IEC 60917-1	NOTE: Harmonized as EN 60917-1:1998 (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	1)	International Electrotechnical Vocabulary (IEV) - Chapter 161: Electromagnetic compatibility	-	-
IEC 60050-826	1)	Chapter 826: Electrical installations of buildings	HD 384.2 S2	2001 ²⁾
IEC 60068-1	1)	Environmental testing Part 1: General and guidance	EN 60068-1	1994 ²⁾
IEC 60529	1)	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991 1993 ²⁾
IEC 61000-4-3 (mod)	1)	Electromagnetic compatibility (EMC) Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	EN 61000-4-3	1996 ²⁾
IEC 61000-4-23	1)	Part 4-23: Testing and measurement techniques - Test methods for protective devices for HEMP and other radiated disturbances	EN 61000-4-23	2000 ²⁾

1) undated reference.

2) valid edition at date of issue.

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PUBLICATION FONDAMENTALE EN CEM
BASIC EMC PUBLICATION

Compatibilité électromagnétique (CEM) –

Partie 5-7:

Guide d'installation et d'atténuation –

Degrés de protection procurés par les enveloppes

contre les perturbations électromagnétiques

(Code EM)

Electromagnetic compatibility (EMC) –

Part 5-7:

Installation and mitigation guidelines –

Degrees of protection provided by enclosures

against electromagnetic disturbances (EM code)

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMAGNETIC COMPATIBILITY (EMC) –

**Part 5-7: Installation and mitigation guidelines –
Degrees of protection provided by enclosures against
electromagnetic disturbances (EM code)**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organisation for standardisation comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardisation 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 organisations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organisation for Standardisation (ISO) in accordance with conditions determined by agreement between the two organisations.
- 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.
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- 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.
IEC 61000-5-7:2002
- 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 61000-5-7 has been prepared by subcommittee 77C, High power transient phenomena, of IEC technical committee 77: Electromagnetic compatibility (EMC). It has the status of a basic EMC publication in accordance with IEC Guide 107.

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

FDIS	Report on voting
77C/96/FDIS	77C/102/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, C and D are given for information only.

The committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be

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

INTRODUCTION

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

Part 1: General

General consideration (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 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, technical specifications or technical reports, some of which have already been published as sections. Others will be published with the part number followed by a dash and completed by a second number identifying the subdivision (example: 61000-6-1).

This part of IEC 61000 gives electromagnetic shielding performance markings, and test requirements and procedures related to the electromagnetic shielding performance of empty electrical and electronics equipment enclosures.

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 5-7: Installation and mitigation guidelines – Degrees of protection provided by enclosures against electromagnetic disturbances (EM code)

1 Scope

This part of IEC 61000 describes performance requirements, test methods and classification procedures for degrees of protection provided by empty enclosures against electromagnetic disturbances for frequencies between 10 kHz and 40 GHz. The shielding performance is to be measured prior to the installation of internal electrical and/or electronic equipment and components. This shielding protection is measured for the purpose of demonstrating that the enclosure provides adequate shielding of electromagnetic energy to support acceptable performance of the complete assembled units when tested to applicable IEC standards. However, it should be noted that satisfactory performance of an empty enclosure does not necessarily ensure that the completed units will pass all EMC performance test standards for the operating equipment (see discussion in annex A).

The purpose of this standard is to provide a repeatable means for evaluating the electromagnetic shielding performance of empty mechanical enclosures, including cabinets and subracks, and to specify a marking code to allow a manufacturer to select an enclosure with a known capability for attenuating electromagnetic fields. The requirements for immunity to various types of electromagnetic disturbances, including lightning and high-altitude electromagnetic pulse (HEMP) will need to be considered by manufacturers when determining the need for application of this standard for specific equipment and applications, and for the specific enclosure shielding requirements which are necessary as a function of frequency.

The adoption of the classification system in this standard will, whenever possible, promote uniformity in methods of describing the protection against electromagnetic stresses provided by the enclosure. This includes protection of equipment inside the enclosure from external electromagnetic stresses, as well as protection of external equipment from internally generated electromagnetic stresses.

Technical Committees responsible for enclosures may decide on the extent and manner in which the classification defined in this standard is used in their standards and to define "enclosure" as it applies to their equipment. However, the tests and performance categories must not differ from those specified in this standard. An informative guide for the details to be specified in relevant enclosure product standards is given in annex B.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61000. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 61000 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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

IEC 60050(826): *International Electrotechnical Vocabulary (IEV) – Chapter 826: Electrical installations of buildings*

IEC 60068-1: *Environmental testing – Part 1: General and guidance*

IEC 60529: *Degrees of protection provided by enclosures (IP Code)*

IEC 61000-4-3: *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 3: Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-23: *Electromagnetic compatibility (EMC) – Part 4-23: Testing and measurement techniques – Test methods for (protective devices for HEMP) and other radiated disturbances*

3 General

[SIST EN 61000-5-7:2002](https://standards.iteh.ai/catalog/standards/sist/d75bc90d-8889-4d05-9335-5dedb90d9f73/sist-en-61000-5-7-2002)

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Other standards in the IEC series define requirements for construction and immunity testing of electrical and electronic equipment which shall withstand the stresses produced by electromagnetic disturbances, including fast electrical transients and electrostatic discharge (ESD). In addition, there are similar requirements for testing to verify immunity to high-altitude electromagnetic pulses (HEMP). There are also existing standards for these enclosures for other effects, primarily IEC 60529.

However, manufacturers of this electrical and electronic equipment need to either construct or procure enclosures for this equipment prior to the electromagnetic disturbance immunity testing noted in the previous paragraph. With experience the manufacturers will be able to determine the particular levels of electromagnetic shielding effectiveness which are sufficient to permit their finished product to pass the required EMC immunity and emissions tests.

Shielding Effectiveness (SE) is a broad term describing the ability of an EM shield to reduce or attenuate external (or internally produced) electromagnetic fields and external (or internal) surface currents before they reach the interior (exterior) of the shield. Typically, the shield encloses sensitive electronic equipment that must be protected from exterior electromagnetic disturbances. However, shields are also used to reduce electromagnetic fields produced by interior equipment from reaching the exterior of the shield. EM protection is provided by a complete topology, consisting not only of a metallic shell surrounding the shielded volume, but also including proper treatments of required electrical (power, communication, antenna, signal,