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EUROPEAN STANDARD

**EN 61000-4-2**

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 1995

ICS 29.020

Descriptors: Electric equipment, electronic equipment, electromagnetic compatibility, electrostatic protection, electrostatic discharge tests, characteristics, testing conditions

English version

**Electromagnetic compatibility (EMC)**  
**Part 4: Testing and measurement techniques**  
**Section 2: Electrostatic discharge immunity test**  
**Basic EMC Publication**  
**(IEC 1000-4-2:1995)**

Compatibilité électromagnétique (CEM)

Partie 4: Techniques d'essai et de mesure

Section 2: Essais d'immunité aux décharges électrostatiques

Publication fondamentale en CEM  
(CEI 1000-4-2:1995)

Elektromagnetische

Verträglichkeit (EMV)

Teil 4: Prüf- und Meßverfahren

Hauptabschnitt 2: Störfestigkeit gegen die Entladung statischer Elektrizität

EMV-Grundnorm

(IEC 1000-4-2:1995)

This European Standard was approved by CENELEC on 1995-03-06. 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, 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 77B(CO)21, future edition 1 of IEC 1000-4-2, prepared by SC 77B, High-frequency phenomena, of IEC TC 77, Electromagnetic compatibility, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61000-4-2 on 1995-03-06.

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) 1996-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1996-03-01

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 and B are informative.  
Annex ZA has been added by CENELEC.

### Endorsement notice

The text of the International Standard IEC 1000-4-2:1995 was approved by CENELEC as a European Standard without any modification.

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## ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD  
WITH THE REFERENCES OF THE RELEVANT 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.

NOTE : When the international publication has been modified by CENELEC common modifications, indicated by (mod), the relevant EN/HD applies.

IEC Publication	Date	Title	EN/HD	Date
50(161)	1990	International Electrotechnical Vocabulary (IEV) Chapter 161: Electromagnetic compatibility	-	-
68-1	1988	Environmental testing - Part 1: General and guidance	EN 60068-1*	1994

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\* EN 60068-1 includes the corrigendum October 1988 and A1:1992 to IEC 68-1

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NORME  
INTERNATIONALE  
INTERNATIONAL  
STANDARD

CEI  
IEC  
1000-4-2

Première édition  
First edition  
1995-01

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**Compatibilité électromagnétique (CEM)**

**Partie 4:**

Techniques d'essai et de mesure –

Section 2: Essai d'immunité aux  
décharges électrostatiques

Publication fondamentale en CEM

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**Electromagnetic compatibility (EMC)**

**Part 4:**

Testing and measurement techniques –

Section 2: Electrostatic discharge  
immunity test

Basic EMC Publication

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International Electrotechnical Commission  
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Pour prix, voir catalogue en vigueur  
For price, see current catalogue

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## ELECTROMAGNETIC COMPATIBILITY (EMC)

Part 4: Testing and measurement techniques –  
Section 2: Electrostatic discharge immunity test

## Basic EMC publication

## 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 cooperation 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, prepared by technical committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 3) They have the form of recommendations for international use published in the form of standards, 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.

International Standard IEC 1000-4-2 has been prepared by sub-committee 77B: High-frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

It forms section 2 of part 4 of IEC 1000. It has the status of a basic EMC publication in accordance with IEC guide 107.

It is based on the IEC 801-2 (second edition: 1991): *Electromagnetic compatibility for industrial process measurement and control equipment – Part 2: Electrostatic discharge requirements*, prepared by IEC technical committee 65: Industrial-process measurement and control.

According to a recommendation of ACEC at its meeting of December 1989, the scope of this standard has been extended to all kinds of electrical and electronic equipment. For this purpose it has been decided to transfer the 801 series of publications to the 1000-4 series: *EMC testing and measurement techniques*, of technical committee 77.

No technical changes, only editorial amendments, have been made with this transfer and reference to IEC 801-2 (1991) or IEC 1000-4-2 is equivalent.

The text of IEC 801-2, second edition, is based on the following documents:

DIS	Reports on voting
65(CO)49 65(CO)52	65(CO)51 65(CO)54

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

The text of this standard, IEC 1000-4-2, is based on the following document.

DIS	Report on voting
77B(CO)21	77B/145/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.

Annexes A and B are for information only.

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## INTRODUCTION

IEC 1000-4 is a part of the IEC 1000 series, 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 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 9: Miscellaneous**

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Each part is further subdivided into sections which are to be published either as international standards or as technical reports.

These sections of IEC 1000-4 will be published in chronological order and numbered accordingly.

This section is an international standard which gives immunity requirements and test procedures related to "electrostatic discharge".

## ELECTROMAGNETIC COMPATIBILITY (EMC)

### Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test

#### Basic EMC publication

#### 1 Scope

This International Standard relates to the immunity requirements and test methods for electrical and electronic equipment subjected to static electricity discharges, from operators directly, and to adjacent objects. It additionally defines ranges of test levels which relate to different environmental and installation conditions and establishes test procedures.

The object of this standard is to establish a common and reproducible basis for evaluating the performance of electrical and electronic equipment when subjected to electrostatic discharges. In addition, it includes electrostatic discharges which may occur from personnel to objects near vital equipment.

This standard defines:

- typical waveform of the discharge current;
- range of test levels;
- test equipment;
- test set-up;
- test procedure.

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This standard gives specifications for test performed in "laboratories" and "post-installation tests" performed on equipment in the final installation.

This standard does not intend to specify the tests to be applied to particular apparatus or systems. Its main aim is to give a general basic reference to all concerned product committees of the IEC. The product committees (or users and manufacturers of equipment) remain responsible for the appropriate choice of the tests and the severity level to be applied to their equipment.

In order not to impede the task of coordination and standardization, the product committees or users and manufacturers are strongly recommended to consider (in their future work or revision of old standards) the adoption of the relevant immunity tests specified in this standard.

#### 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this section of IEC 1000-4. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties

to agreements based on this section of IEC 1000-4 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 50(161): 1990, *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility*

IEC 68-1: 1988, *Environmental testing – Part 1: General and guidance*

### 3 General

This standard relates to equipment, systems, sub-systems and peripherals which may be involved in static electricity discharges owing to environmental and installation conditions, such as low relative humidity, use of low-conductivity (artificial-fibre) carpets, vinyl garments, etc., which may exist in allocations classified in standards relevant to electrical and electronic equipment (for more detailed information, see clause A.1 of annex A).

The tests described in this standard are considered to be a first step in the direction of commonly used tests for the qualitative evaluation of the performance of all electrical and electronic equipment as referred to in clause 1.

NOTE – From the technical point of view the precise term for the phenomenon would be "static electricity discharge". However, the term "electrostatic discharge" (ESD) is widely used in the technical world and in technical literature. Therefore, it has been decided to retain the term ESD in the title of this standard.

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### 4 Definitions

For the purpose of this section of IEC 1000-4, the following definitions and terms apply and are applicable to the restricted field of electrostatic discharge; not all of them are included in IEC 50(161) [IEV].

**4.1 degradation (of performance):** An undesired departure in the operational performance of any device, equipment or system from its intended performance. [IEV 161-01-19]

NOTE – The term "degradation" can apply to temporary or permanent failure.

**4.2 electromagnetic compatibility (EMC):** The ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment. [IEV 161-01-07]

**4.3 antistatic material:** Material exhibiting properties which minimize charge generation when rubbed against or separated from the same or other similar materials.

**4.4 energy storage capacitor:** The capacitor of the ESD-generator representing the capacity of a human body charged to the test voltage value. This may be provided as a discrete component, or a distributed capacitance.