

# Electromagnetic compatibility (EMC) —

## Part 4-4: Testing and measurement techniques — Electrical fast transient/burst immunity test

The European Standard EN 61000-4-4:1995, with the incorporation of amendments A1:2001 and A2:2001, has the status of a British Standard

ICS 29.020

# Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee GEL/110, Electromagnetic compatibility, to Subcommittee GEL/110/10, Electromagnetic compatibility — High frequency disturbances, upon which the following bodies were represented:

- Association of Consulting Scientists
- Association of Manufacturers of Domestic Electrical Appliances
- British Telecommunications plc
- ERA Technology Ltd.
- Electrical Installation Equipment Manufacturers' Association (BEAMA Ltd.)
- Federation of the Electronics Industry
- Lighting Industry Federation Ltd.
- Power Supply Manufacturers' Association — PSMA (BEAMA Ltd.)
- Radiocommunications Agency
- Sound and Communications Industries' Federation

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 November 1995

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## National foreword

This British Standard has been prepared by Subcommittee GEL/110/10 and is the English language version of EN 61000-4-4:1995, *Electromagnetic compatibility (EMC) — Part 4-4: Testing and measurement techniques — Electrical fast transient/burst immunity test*, including amendments A1:2001 and A2:2001, published by the European Committee for Electrotechnical Standardization (CENELEC). It is identical with IEC 61000-4-4:1995, including amendments 1:2000 and A2:2001, published by the International Electrotechnical Commission (IEC).

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by **A1** **A1**.

IEC 61000 has been designated a Basic EMC publication for use in the preparation of dedicated product, product family and generic EMC standards.

IEC 61000 will be published in separate Parts in accordance with the following structure.

|         |                                                                                                                                 |
|---------|---------------------------------------------------------------------------------------------------------------------------------|
| Part 1. | General<br>General considerations (introduction, fundamental principles)<br>Definitions, terminology                            |
| Part 2. | Environment<br>Description of the environment<br>Classification of the environment<br>Compatibility levels                      |
| Part 3. | Limits<br>Emission limits<br>Immunity limits (in so far as they do not fall under the responsibility of the product committees) |
| Part 4. | Testing and measurement techniques<br>Measurement techniques<br>Testing techniques                                              |
| Part 5. | Installation and mitigation guidelines<br>Installation guidelines<br>Mitigation methods and devices                             |
| Part 9. | Miscellaneous                                                                                                                   |

Each Part will be subdivided into Sections each of which may be published as either a standard or a Technical Report.

From 1 January 1997, all IEC publications have the number 60000 added to the old number. For instance, IEC 27-1 has been renumbered as IEC 60027-1. For a period of time during the change over from one numbering system to the other, publications may contain identifiers from both systems.

### Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Standards Catalogue* under the section entitled “International Standards Correspondence Index” or by using the “Find” facility of the *BSI Electronic Catalogue* or of British Standards Online.

The publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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### Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 27 and a back cover.

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Descriptors: Electric equipment, electronic equipment, electromagnetic compatibility, transient response, characteristics, testing conditions

English version

# Electromagnetic compatibility (EMC) — Part 4-4: Testing and measurement techniques — Electrical fast transient/burst immunity test

(including amendments A1:2001 and A2:2001)  
(IEC 61000-4-4:1995 + A1:2000 + A2:2001)

Compatibilité électromagnétique (CEM) —  
Partie 4: Techniques d'essai et de mesure —  
Section 4: Essais d'immunité aux transitoires  
électriques rapides en salves  
(inclut les amendements A1:2001 et A2:2001)  
(CEI 61000-4-4:1995 + A1:2000 + A2:2001)

Elektromagnetische Verträglichkeit (EMV) —  
Teil 4: Prüf- und Meßverfahren —  
Hauptabschnitt 4: Prüfung der Störfestigkeit  
gegen schnelle transiente elektrische  
Storgroßen/Burst  
(enthält Änderungen A1:2001 und A2:2001)  
(IEC 61000-4-4:1995 + A1:2000 + A2:2001)

This European Standard was approved by CENELEC on 1995-03-06. Amendment A1 was approved by CENELEC on 2000-12-01. Amendment A2 was approved by CENELEC on 2001-07-01. 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, 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

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## Foreword

The text of document 77B(CO)22, future edition 1 of IEC 1000-4-4, 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 61000-4-4 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 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 Annex A is informative.

Annex ZA has been added by CENELEC.

## Foreword to amendment A1

The text of documents 77B/291+293/FDIS, future amendment 1 to IEC 61000-4-4:1995, prepared by SS 77B, High frequency phenomena, of IEC TC 77, Electromagnetic compatibility, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 61000-4-4:1995 on 2000-12-01.

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- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2003-12-01

## Foreword to amendment A2

The text of document 77B/314/FDIS, future amendment 2 to IEC 61000-4-4:1995, 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 amendment A2 to EN 61000-4-4:1995 on 2001-07-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2002-04-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2004-07-01

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## Introduction

IEC 61000-4 is a part of the IEC 61000 series, 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 9: Miscellaneous.*

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

These sections of IEC 61000-4 will be published in chronological order and numbered accordingly.

This section is an international standard which gives immunity requirements and test procedure related to “electrical fast transient/burst”.

## 1 Scope

This International Standard relates to the immunity requirements and test methods for electrical and electronic equipment to repetitive electrical fast transients. It additionally defines ranges of test levels 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 repetitive fast transients (bursts), on supply, signal and control ports.

The test is intended to demonstrate the immunity of electrical and electronic equipment when subjected to types of transient disturbances such as those originating from switching transients (interruption of inductive loads, relay contact bounce, etc.).

The standard defines:

- test voltage waveform;
- range of test levels;
- test equipment;
- test set-up;
- test procedure.

The standard gives specifications for tests 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 61000-4. 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 61000-4 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 60050-161:1990, *International Electrotechnical Vocabulary (IEV) — Chapter 161: Electromagnetic compatibility*.

IEC 60068-1:1988, *Environmental testing — Part 1: General and guidance*.

## 3 General

The repetitive fast transient test is a test with bursts consisting of a number of fast transients, coupled into power supply, control and signal ports of electrical and electronic equipment. Significant for the test are the short rise time, the repetition rate and the low energy of the transients.

## 4 Definitions

For the purpose of this section of IEC 61000-4, the following definitions and terms apply and are applicable to the restricted field of electrical fast transient/burst; not all of them are included in IEC 60050-161 [IEV].

### 4.1

#### **EUT**

equipment under test

### 4.2

#### **port**

particular interface of the EUT with the external electromagnetic environment

### 4.3

#### **EFT/B**

electrical fast transient/burst

### 4.4

#### **coupling**

interaction between circuits, transferring energy from one circuit to another

### 4.5

#### **coupling network**

electrical circuit for the purpose of transferring energy from one circuit to another

### 4.6

#### **decoupling network**

electrical circuit for the purpose of preventing EFT voltage applied to the EUT from affecting other devices, equipment or systems which are not under test

### 4.7

#### **coupling clamp**

device of defined dimensions and characteristics for common mode coupling of the disturbance signal to the circuit under test without any galvanic connection to it

### 4.8

#### **ground (reference) plane**

a flat conductive surface whose potential is used as a common reference  
[IEV 161-04-36]