



**NSAI**  
Standards

Irish Standard  
I.S. EN 61000-4-28:2000

# Electromagnetic compatibility (EMC) -- Part 4-28: Testing and measurement techniques - Variation of power frequency, immunity test (IEC 61000-4 -28:1999 (EQV))

## I.S. EN 61000-4-28:2000

*Incorporating amendments/corrigenda issued since publication:*

EN 61000-4-28:2000/A1:2004

EN 61000-4-28:2000/A2:2009

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SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 61000-4-28/A2**

May 2009

ICS 33.100.20

English version

**Electromagnetic compatibility (EMC) -  
Part 4-28: Testing and measurement techniques -  
Variation of power frequency, immunity test for equipment  
with input current not exceeding 16 A per phase  
(IEC 61000-4-28:1999/A2:2009)**

Compatibilité électromagnétique (CEM) -  
Partie 4-28: Techniques d'essai  
et de mesure -  
Essai d'immunité à la variation  
de la fréquence d'alimentation  
pour des matériels avec un courant appelé  
n'excédant pas 16 A par phase  
(CEI 61000-4-28:1999/A2:2009)

Elektromagnetische Verträglichkeit (EMV) -  
Teil 4-28: Prüf- und Messverfahren -  
Prüfung der Störfestigkeit von Geräten  
mit einem Eingangsstrom, der 16 A je Leiter  
nicht überschreitet, gegen Schwankungen  
der energietechnischen Frequenz  
(Netzfrequenz)  
(IEC 61000-4-28:1999/A2:2009)

This amendment A2 modifies the European Standard EN 61000-4-28:2000; it was approved by CENELEC on 2009-03-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 amendment 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, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Central Secretariat: avenue Marnix 17, B - 1000 Brussels**

**I.S. EN 61000-4-28:2000**

EN 61000-4-28:2000/A2:2009

– 2 –

**Foreword**

The text of document 77A/673/FDIS, future amendment 2 to IEC 61000-4-28:1999, 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 amendment A2 to EN 61000-4-28:2000 on 2009-03-01.

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) 2009-12-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2012-03-01

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**Endorsement notice**

The text of amendment 2:2009 to the International Standard IEC 61000-4-28:1999 was approved by CENELEC as an amendment to the European Standard without any modification.

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EUROPEAN STANDARD

**EN 61000-4-28/A1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2004

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English version

**Electromagnetic compatibility (EMC)**  
**Part 4-28: Testing and measurement techniques –**  
**Variation of power frequency, immunity test**  
(IEC 61000-4-28:1999/A1:2001)

Compatibilité électromagnétique (CEM)  
Partie 4-28: Techniques d'essai  
et de mesure –  
Essai d'immunité à la variation  
de la fréquence d'alimentation  
(CEI 61000-4-28:1999/A1:2001)

Elektromagnetische Verträglichkeit (EMV)  
Teil 4-28: Prüf- und Messverfahren -  
Prüfung der Störfestigkeit gegen  
Schwankungen der energietechnischen  
Frequenz (Netzfrequenz)  
(IEC 61000-4-28:1999/A1:2001)

This amendment A1 modifies the European Standard EN 61000-4-28:2000; it was approved by CENELEC on 2004-05-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

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Comité Européen de Normalisation Electrotechnique  
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**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

**I.S. EN 61000-4-28:2000**

EN 61000-4-28:2000/A1:2004

- 2 -

**Foreword**

The text of amendment 1:2001 to the International Standard IEC 61000-4-28:1999, prepared by SC 77B, High frequency phenomena, of IEC TC 77, Electromagnetic compatibility, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as amendment A1 to EN 61000-4-28:2000 on 2004-05-01 without any modification.

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at national level by publication of an identical  
national standard or by endorsement (dop) 2005-05-01
- latest date by which the national standards conflicting  
with the amendment have to be withdrawn (dow) 2007-05-01

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**Endorsement notice**

The text of amendment 1:2001 to the International Standard IEC 61000-4-28:1999 was approved by CENELEC as an amendment to the European Standard without any modification.

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EUROPEAN STANDARD

**EN 61000-4-28**

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2000

ICS 33.100.20

English version

**Electromagnetic compatibility (EMC)**  
**Part 4-28: Testing and measurement techniques**  
**Variation of power frequency, immunity test**  
**(IEC 61000-4-28:1999)**

Compatibilité électromagnétique (CEM)  
Partie 4-28: Techniques d'essai et de  
mesure - Essai d'immunité à la variation  
de la fréquence d'alimentation  
(CEI 61000-4-28:1999)

Elektromagnetische  
Verträglichkeit (EMV)  
Teil 4-28: Prüf- und Messverfahren  
Prüfung der Störfestigkeit gegen  
Schwankungen der energietechnischen  
Frequenz (Netzfrequenz)  
(IEC 61000-4-28:1999)

This European Standard was approved by CENELEC on 2000-01-01. 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.

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**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

**I.S. EN 61000-4-28:2000**

Page 2

EN 61000-4-28:2000

**Foreword**

The text of document 77A/287/FDIS, future edition 1 of IEC 61000-4-28, 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 61000-4-28 on 2000-01-01.

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) 2000-10-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2003-01-01

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 and B are informative.

Annex ZA has been added by CENELEC.

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**Endorsement notice**

The text of the International Standard IEC 61000-4-28:1999 was approved by CENELEC as a European Standard without any modification.

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**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	1990	International Electrotechnical Vocabulary (IEV) Chapter 161: Electromagnetic compatibility	-	-
IEC 60068-1	1988	Environmental testing Part 1: General and guidance	EN 60068-1 <sup>1)</sup>	1994
IEC 61000-2-4 + corr. August	1994 1994	Electromagnetic compatibility (EMC) Part 2: Environment Section 4: Compatibility levels in industrial plants for low-frequency conducted disturbances	EN 61000-2-4	1994

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1) EN 60068-1 includes the corrigendum October 1988 and A1:1992 to IEC 60068-1.

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## CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references.....	6
3 General .....	7
4 Definitions .....	7
5 Test levels.....	7
6 Test equipment.....	8
6.1 Test generators: characteristics and performances .....	8
6.2 Verification of the characteristics .....	9
7 Test set-up .....	10
8 Test procedure .....	10
8.1 Climatic conditions.....	10
8.2 Execution of the test.....	10
9 Evaluation of test results.....	11
10 Test report.....	11
Annex A (informative) Sources and effects of variation of the power frequency .....	14
Annex B (informative) Electromagnetic environment classes.....	15
Figure 1 – Frequency variation sequence .....	12
Figure 2 – Example of transitional period $t_p$ .....	12
Figure 3 – Schema of test instrumentation with power amplifier .....	13
Figure 4 – Example of test generator verification load.....	9
Table 1 – Test levels for frequency variations .....	8
Table 2 – Characteristics of the generator .....	8

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTROMAGNETIC COMPATIBILITY (EMC) –**

**Part 4-28: Testing and measurement techniques –  
Variation of power frequency, immunity test for equipment  
with input current not exceeding 16 A per phase**

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 IEC 61000-4-28 has been prepared by subcommittee 77A: Low-frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

This standard forms part 4-28 of the IEC 61000 series. It has the status of a basic EMC publication in accordance with IEC Guide 107.

This consolidated version of IEC 61000-4-28 consists of the first edition (1999) [77A/287/FDIS and 77A/299/RVD], its amendment 1 (2001) [77B/291+293/FDIS and 77B/298+300/RVD] and its amendment 2 (2009) [77A/673/FDIS and 77A/676/RVD].

The technical content is therefore identical to the base edition and its amendments and has been prepared for user convenience.

It bears the edition number 1.2.

**I.S. EN 61000-4-28:2000**

– 4 –

61000-4-28 © IEC:1999+A1:2001  
+A2:2009

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

Annexes A and B are for information only.

The committee has decided that the contents of the base publication and its amendments 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.

**I.S. EN 61000-4-28:2000**

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+A2:2009

– 5 –

## 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 Standard, 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.

## **ELECTROMAGNETIC COMPATIBILITY (EMC) –**

### **Part 4-28: Testing and measurement techniques – Variation of power frequency, immunity test for equipment with input current not exceeding 16 A per phase**

#### **1 Scope**

This part of IEC 61000 is a basic EMC (electromagnetic compatibility) publication. It considers immunity tests for electric and/or electronic equipment in its electromagnetic environment. Only conducted phenomena are considered, including immunity tests for equipment connected to public and industrial networks.

The object of this part is to establish a reference for evaluating the immunity of electric and electronic equipment when subjected to variations of the power frequency.

This standard applies to electric and/or electronic equipment connected to 50 Hz or 60 Hz distributed network with rated line current up to 16 A per phase.

It does not apply to electric and/or electronic equipment connected to a.c. 400 Hz distribution networks. Tests concerning these networks will be covered by other IEC standards.

In general, electrical and electronic equipment is not susceptible to minor variations of the power frequency. Testing according to this standard should be limited to products which are assessed to be susceptible to power frequency variations by virtue of design, environment or failure consequences.

The immunity test levels required for a specific electromagnetic environment together with the performance criteria are indicated in the product, product family or generic standards as applicable.

#### **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 (IEV) – Chapter 161 Electro-magnetic compatibility*

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

IEC 61000-2-4, *Electromagnetic compatibility (EMC) – Part 2: Environment – Section 4: Compatibility levels in industrial plants for low-frequency conducted disturbances*

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