

# CONSOLIDATED VERSION

# VERSION CONSOLIDÉE



BASIC EMC PUBLICATION

PUBLICATION FONDAMENTALE EN CEM

**Electromagnetic compatibility (EMC) –  
Part 4-13: Testing and measurement techniques – Harmonics and  
interharmonics including mains signalling at a.c. power port, low frequency  
immunity tests**

**Compatibilité électromagnétique (CEM) –  
Partie 4-13: Techniques d'essai et de mesure – Essais d'immunité basse  
fréquence aux harmoniques et inter-harmoniques incluant les signaux transmis  
sur le réseau électrique alternatif**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### ELECTROMAGNETIC COMPATIBILITY (EMC) –

#### Part 4-13 : Testing and measurement techniques – Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests

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**This Consolidated version of IEC 61000-4-13 bears the edition number 1.2. It consists of the first edition (2002-03) [documents 77A/368/FDIS and 77A/377/RVD], its amendment 1 (2009-05) [documents 77A/668/CDV and 77A/684/RVC] and its amendment 2 (2015-12) [documents 77A/904/FDIS and 77A/916/RVD]. The technical content is identical to the base edition and its amendments.**

**In this Redline version, a vertical line in the margin shows where the technical content is modified by amendments 1 and 2. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.**

International Standard IEC 61000-4-13 has been prepared by subcommittee 77A: Low frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

This standard has the status of a basic EMC publication in accordance with IEC Guide 107.

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 the base publication and its amendments will remain unchanged until the stability 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

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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. Others will be published with the part number followed by a dash and a second number identifying the subdivision (example: 61000-6-1).

This part is an EMC basic standard which gives immunity requirements and test procedures related to harmonics and interharmonics including mains signalling at a.c. power port.

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

### **Part 4-13: Testing and measurement techniques – Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests**

#### **1 Scope and object**

This part of IEC 61000 defines the immunity test methods and range of recommended basic test levels for electrical and electronic equipment with rated current up to 16 A per phase at disturbance frequencies up to and including 2 kHz (for 50 Hz mains) and 2,4 kHz (for 60 Hz mains) for harmonics and interharmonics on low voltage power networks.

It does not apply to electrical and electronic equipment connected to 16 2/3 Hz, or to 400 Hz a.c. networks. Tests for these networks will be covered by future standards.

The object of this standard is to establish a common reference for evaluating the functional immunity of electrical and electronic equipment when subjected to harmonics and interharmonics and mains signalling frequencies. The test method documented in this part of IEC 61000 describes a consistent method to assess the immunity of an equipment or system against a defined phenomenon. As described in IEC guide 107, this is a basic EMC publication for use by product committees of the IEC. As also stated in Guide 107, the IEC product committees are responsible for determining whether this immunity test standard should be applied or not, and if applied, they are responsible for determining the appropriate test levels and performance criteria. TC 77 and its sub-committees are prepared to co-operate with product committees in the evaluation of the value of particular immunity tests for their products.

The verification of the reliability of electrical components (for example capacitors, filters, etc.) is not in the scope of the present standard. Long term thermal effects (greater than 15 min) are not considered in this standard.

The levels proposed are more adapted for residential, commercial and light industry environments. For heavy industrial environments the product committees are responsible for the definition of a class X with the necessary levels. They have also the possibility of defining more complex waveforms for their own need. Nevertheless, the simple waveforms proposed have been mainly observed on several networks (flat curve more often for single phase system) and also on industrial networks (overswing curve more for three phase systems).

#### **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: Electromagnetic compatibility*

IEC 61000-2-2, *Electromagnetic compatibility (EMC) – Part 2-2: Environment – Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems*

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

IEC 61000-4-7, *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*

### 3 Definitions

For the purposes of this part of IEC 61000, the following definitions and terms apply as well as the definitions of IEC 60050(161):

#### 3.1

##### **immunity**

ability of a device, equipment or system to perform without degradation in the presence of an electromagnetic disturbance

[IEV 161-01-20]

#### 3.2

##### **harmonic (component)**

component of order greater than 1 of the Fourier series of a periodic quantity

[IEV 161-02-18]

#### 3.3

##### **fundamental (component)**

component of order 1 of the Fourier series of a periodic quantity

[IEV 161-02-17]

#### 3.4

##### **flat curve waveshape**

waveform that follows a time related function in which each half-wave consists of three parts:

Part 1: starts from zero and follows a pure sine function up to the specified value;

Part 2: is a constant value;

Part 3: follows a pure sine function down to zero

#### 3.5

##### **overswing waveshape**

waveform which consists of discrete values of the fundamental harmonic, the 3<sup>rd</sup> and the 5<sup>th</sup> harmonics with the specified phase shift

#### 3.6

##### **$f_1$**

fundamental frequency

#### 3.7

##### **mains signalling frequencies**

signal frequencies between harmonics for control and communication

#### 3.8

##### **EUT**

equipment under test