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# INTERNATIONAL STANDARD



BASIC EMC PUBLICATION

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

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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# INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

### **Part 4-23: Testing and measurement techniques – Test methods for protective devices for HEMP and other radiated disturbances**

#### 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 61000-4-23 has been prepared by subcommittee 77C: High power transient phenomena, of IEC technical committee 77: Electromagnetic compatibility.

It forms Part 4-23 of IEC 61000. It has the status of a basic EMC publication in accordance with IEC Guide 107.

This second edition cancels and replaces the first edition published in 2000. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) updates to the shielding effectiveness (SE) test method in Clause 5;
- b) a new Annex F describing methods for testing 'inside-to-out' has been added.

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

CDV	Report on voting
77C/253/CDV	77C/257/RVC

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 2.

A list of all parts in the IEC 61000 series, published under the general title *Electromagnetic compatibility (EMC)*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

A bilingual version of this publication may be issued at a later date.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## 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, 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: IEC 61000-6-1).

The IEC has initiated the preparation of standardized methods to protect civilian society from the effects of high power electromagnetic (HPEM) environments. Such effects could disrupt systems for communications, electric power, information technology, etc.

This part of IEC 61000 is an international standard that establishes the test concepts, set-ups, required equipment, and test procedures for protective devices against HEMP radiated disturbances.

Annex F provides examples of the SE test method placing the TX antenna inside the barrier.

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

### **Part 4-23: Testing and measurement techniques – Test methods for protective devices for HEMP and other radiated disturbances**

#### **1 Scope**

This part of IEC 61000 provides a protective devices test method for HEMP and other radiated disturbances. It is primarily intended for HEMP testing but can be applied to other externally generated radiated disturbances where appropriate. It provides a brief description of the most important concepts for testing of shielding elements. For each test, the following basic information is provided:

- theoretical foundation of the test (the test concepts);
- test set-up including outside-to-in and inside-to-out measurements;
- required equipment;
- test procedures;
- data processing.

This international standard does not provide information on requirements for specific levels for testing.

This part of IEC 61000 has been updated to include a new test method.

Due to the available space, a transmitting antenna position outside the barrier has mainly been suggested. However, nowadays, many EMP protection facilities in practical use do not actually have enough space available outside the electromagnetic barrier due to physical constraints such as concrete walls or soil to allow the method described in IEC 61000-4-23:2000 (edition 1) to be applied correctly. From experience many facilities have available space for a 1 m separation or less only.

Therefore, in many practical cases it is not possible to measure shielding effectiveness according to the test method of previous documents. The constructors for EMP protection facilities are also unwilling to build facilities with extra space for measurements with the transmitting antenna outside the barrier due to the great expense and inefficiency of the operational working area for new or existing buildings.

This document provides additionally a method that allows the transmitting antenna to be placed inside the enclosure and the receiving antenna outside the barrier ('inside-to-out' method). Annex F includes test set-up and procedure examples.

#### **2 Normative references**

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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) – Part 161: Electromagnetic compatibility* (available at [www.electropedia.org](http://www.electropedia.org))

IEC 61000-2-9, *Electromagnetic compatibility (EMC) – Part 2: Environment – Section 9: Description of HEMP environment – Radiated disturbance*

IEC 61000-5-3, *Electromagnetic compatibility (EMC) – Part 5-3: Installation and mitigation guidelines – HEMP protection concepts*