

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



BASIC EMC PUBLICATION

PUBLICATION FONDAMENTALE EN CEM

**Electromagnetic compatibility (EMC) –  
Part 4-24: Testing and measurement techniques – Test methods for protective  
devices for HEMP conducted disturbance**

**Compatibilité électromagnétique (CEM) –  
Partie 4-24: Techniques d'essai et de mesure – Méthodes d'essai pour les  
dispositifs de protection pour perturbations conduites IEMN-HA**



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IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTROMAGNETIC COMPATIBILITY (EMC) –****Part 4-24: Testing and measurement techniques –  
Test methods for protective devices  
for HEMP conducted disturbance**

## FOREWORD

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International Standard IEC 61000-4-24 has been prepared by subcommittee 77C: High power transient phenomena, of IEC technical committee 77: Electromagnetic compatibility.

This Part 4-24 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 1997. This edition constitutes a technical revision.

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

- a) A new Clause 5: Measurement method for HEMP combination filters, which contains 5.1 Verification setup, 5.2 Measurement setup, 5.3 Measurement instrument, 5.4 Test modes,

5.5 Measurement procedures, 5.6 Evaluation of test results, which introduced performance criteria of filter, and 5.7 Test report.

- b) A new informative Annex A: Investigation for the establishment of a measurement setup, which was based on Clause 5.
- c) A new informative Annex B: Test method for the quantitative determination of the direct response behaviours of a coaxial surge protector.

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

FDIS	Report on voting
77C/245/FDIS	77C/250/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.

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
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## INTRODUCTION

This standard is part of the IEC 61000 series of standards, 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

### 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 required test procedures for protective devices for HEMP conducted disturbance, such as gas discharge tubes, varistors, two-port SPDs and HEMP combination filters.

The application of this standard is, however, not dependent on access to other sections and parts of the IEC 61000, except for those specifically referred to.

## ELECTROMAGNETIC COMPATIBILITY (EMC) –

### Part 4-24: Testing and measurement techniques – Test methods for protective devices for HEMP conducted disturbance

#### 1 Scope

This part of IEC 61000 deals with methods for testing protective devices for HEMP conducted disturbance. It includes two-terminal elements, such as gas discharge tubes, varistors, and two-port SPDs, such as HEMP combination filters. It covers testing of voltage breakdown and voltage-limiting characteristics but also methods to measure the residual voltage and/or the residual current, peak rate of rise and root action for the case of very fast changes of voltage and current as a function of time.

This standard does not cover insertion loss measurement methods.

#### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61000-2-10, *Electromagnetic compatibility (EMC) – Part 2-10: Environment – Description of HEMP environment – Conducted disturbance*

#### 3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms, definitions and abbreviated terms apply.

##### 3.1 Terms and definitions

###### 3.1.1

###### **feed-through device**

two-port device, which is designed to feed a signal through an electromagnetic barrier (shield)

Note 1 to entry: Typically it is in good electrical contact with the barrier and has one port on each side of the barrier, thus maintaining the isolation of the barrier.

###### 3.1.2

###### **gas discharge tube**

device with two or three metal electrodes hermetically sealed so that gas mixture and pressure are under control, and designed to protect apparatus or personnel from high transient voltages

###### 3.1.3

###### **HEMP**

###### **high-altitude electromagnetic pulse**

electromagnetic pulse produced by a nuclear explosion outside the earth's atmosphere

Note 1 to entry: Typically above an altitude of 30 km.