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INTERNATIONAL STANDARD

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

IEC 61000-4-24:2015+AMD1:2023-08 CSV(en)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTROMAGNETIC COMPATIBILITY (EMC) –

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

FOREWORD

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 61000-4-24 edition 2.1 contains the second edition (2015-11) [documents 77C/245/FDIS and 77C/250/RVD] and its amendment 1 (2023-08) [documents 77C/330/FDIS and 77C/331/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. 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 61000-4-24 has been prepared by subcommittee 77C: High power transient phenomena, of IEC technical committee 77: Electromagnetic compatibility.

It forms Part 4-24 of IEC 61000. It has the status of a basic EMC publication in accordance with IEC Guide 107.

This second 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 mode, 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.

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 document and its amendment will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

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 61000-2-10:2021, *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
GDT
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.