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STANDARD

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Electromagnetic compatibility (EMC) - Part 3-4: Limits - Limitation of emission of harmonic currents in low-voltage power supply systems for equipment with rated current greater than 16 A

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Partie 3-4:

Limites – Limitation des émissions de courants harmoniques dans les réseaux basse tension pour les matériels ayant un courant assigné supérieur à 16 A

Electromagnetic compatibility (EMC) –

Part 3-4:

Limits – Limitation of emission of harmonic currents in low-voltage power supply systems for equipment with rated current greater than 16 A

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Commission Electrotechnique Internationale
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMAGNETIC COMPATIBILITY (EMC) –

**Part 3-4: Limits –
Limitation of emission of harmonic currents
in low-voltage power supply systems
for equipment with rated current greater than 16 A**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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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The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

Technical reports of types 1 and 2 are subject to review within three years of publication to decide whether they can be transformed into International Standards. Technical reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

IEC 61000-3-4, which is a technical report of type 2, has been prepared by subcommittee 77A: Low frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

The text of this technical report is based on the following documents:

CDV	Report on voting
77A/169/CDV	77A/227/RVC

Full information on the voting for the approval of this technical report can be found in the report on voting indicated in the above table.

This document is being issued in the technical report (type 2) series of publications (according to subclause G.3.2.2 of part 1 of the ISO/IEC Directives) as a "prospective standard for provisional application" in the field of electromagnetic compatibility because there is an urgent need for guidance on how standards in this field should be used to meet an identified need.

This document is not to be regarded as an "International Standard". It is proposed for provisional application so that information and experience of its use in practice may be gathered. Comments on the content of this document should be sent to the IEC Central Office.

A review of this technical report (type 2) will be carried out not later than three years after its publication with the options of: extension for another three years; conversion into an International Standard; or withdrawal.

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INTRODUCTION

This technical report is part of the IEC 61000 series, 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 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 a technical report type 2 which gives emission limits for harmonic currents from equipment having an input current exceeding 16 A per phase.

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 3-4: Limits – Limitation of emission of harmonic currents in low-voltage power supply systems for equipment with rated current greater than 16 A

1 Scope

This part of IEC 61000 deals with the emission of disturbances due to harmonics.

The recommendations of this technical report are applicable to electrical and electronic equipment with a rated input current exceeding 16 A per phase and intended to be connected to public low-voltage a.c. distribution systems of the following types:

- nominal voltage up to 240 V, single-phase, two or three wires;
- nominal voltage up to 600 V, three-phase, three or four wires;
- nominal frequency 50 Hz or 60 Hz.

Other distribution systems are excluded.

Tests according to this report are type tests of complete pieces of equipment, for example a speed variable fan, and not of components, for example a converter.

Connection of this equipment to the supply generally requires special agreement between the supply authority and the consumer. This consent will depend upon several factors including the expected levels of disturbance caused by the equipment and the actual situation at the connection point to the power supply system.

These recommendations specify the information required to enable a supply authority to assess equipment regarding harmonic disturbance and to decide whether or not the equipment is acceptable for connection with regard to the harmonic distortion aspect.

NOTE 1 – For these types of equipment only general recommendations on assessment of disturbances can be given. There is no guarantee that the connection of equipment complying with these recommendations will be allowed in all cases, as the consent to connect equipment to the supply depends on the level of disturbance caused by the equipment and the load conditions in the network.

NOTE 2 – These recommendations can also be applied to equipment with a lower rated input current but requiring special consent of the supply authority (see IEC 61000-3-2).

NOTE 3 – These recommendations are not applicable to active filters.

Guidance is given on:

- a) required short-circuit power for harmonics emitting equipment tested or simulated under specified conditions;
- b) methods for type tests or simulations.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61000. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 61000 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60050(161):1990, *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility*

IEC 61000-2-1:1990, *Electromagnetic compatibility (EMC) – Part 2: Environment – Section 1: Description of the environment – Electromagnetic environment for low-frequency conducted disturbances and signalling in public power supply systems*

IEC 61000-2-2:1990, *Electromagnetic compatibility (EMC) – Part 2: Environment – Section 2: Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems*

IEC 61000-3-2:1995, *Electromagnetic compatibility (EMC) – Part 3: Limits – Section 2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*

IEC 61000-3-5:1994, *Electromagnetic compatibility (EMC) – Part 3: Limits – Section 5: Limitation of voltage fluctuations and flicker in low-voltage power supply systems for equipment with rated current greater than 16 A*

IEC 61000-4-7:1991, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 7: General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto*

3 Definitions

Definitions are given in IEC 60050(161). For the purpose of this technical report, the following definitions also apply.

3.1

total harmonic distortion (THD)¹⁾

ratio of the r.m.s value of the harmonics (in this context harmonic currents I_n of the order n) to the r.m.s value of the fundamental, viz.

$$THD = \sqrt{\sum_{n=2}^{40} \left(\frac{I_n}{I_1} \right)^2}$$

¹⁾ This definition has been chosen in accordance with the relevant standards IEC 61000-2-1 and IEC 61000-2-2.