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TECHNICAL REPORT

colour inside

Electromagnetic compatibility (EMC) – Part 1-4: General – Historical rationale for the limitation of power-frequency conducted harmonic current emissions from equipment, in the frequency range up to 2 kHz

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 1-4: General – Historical rationale for the limitation of power-frequency conducted harmonic current emissions from equipment, in the frequency range up to 2 kHz

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC TR 61000-1-4:2005. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC TR 61000-1-4 has been prepared by subcommittee 77A: EMC – Low frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility. It is a Technical Report.

This second edition cancels and replaces the first edition published in 2005. This edition constitutes a technical revision.

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

a) relation between compatibility levels, emission limits and immunity requirements clarified;

b) sharing of emission levels between LV, MV and HV clarified;

c) new historical information added.

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Draft	Report on voting
77A/1136/DTR	77A/1141/RVDTR

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

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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The committee has decided that the contents of this document 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.

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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 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: IEC 61000-6-1).

IEC TR 61000-1-4:2005 (first edition) gave a historical rationale for the emission limits for equipment up to 2005. Since there is new historical material available about the developments in the past several years, SC77A is adding this new historical material as a revision of IEC TR 61000-1-4. The revision also clarifies and amends some existing statements that are now known not to report the history until 2005 correctly.

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 1-4: General – Historical rationale for the limitation of power-frequency conducted harmonic current emissions from equipment, in the frequency range up to 2 kHz

1 Scope

This part of IEC 61000, which is a technical report, reviews the sources and effects of power frequency conducted harmonic current emissions in the frequency range up to 2 kHz on the public electricity supply, and gives an account of the reasoning and calculations leading to the existing emission limits for equipment in the editions of IEC 61000-3-2 [1][1], up to and including ~~the second edition (2000) and its first amendment (2001), and in the first edition of IEC 61000-3-12 (2004)~~ the fifth edition (2018) with Amendment 1 (2020), and in the second edition of IEC 61000-3-12 (2011) [2].

The history is traced from the first supra-national standard on low-frequency conducted emissions into the public electricity supply, EN 50006:1975 [3] and its evolution through IEC (60)555-2 [4] to IEC 61000-3-2 [1], IEC TR 61000-3-4 [5] and IEC 61000-3-12 [2]. To give a full picture of the history, that of the standard for the measuring instrument IEC 61000-4-7 [6] is mentioned as well.

NOTE All IEC standards were renumbered starting from 60000 from 1998-01-01. To indicate the references of standards withdrawn before, or not reprinted after, that date, the “60x” prefix is here enclosed in parentheses. Hence “IEC (60)555-2”.

Some concepts in this document apply to all low voltage AC systems, but the numerical values apply specifically to the European 230 V/400 V 50 Hz system.

~~NOTE A rationale for the limits in future complete revisions of IEC 61000-3-2 or IEC 61000-3-12 or both will be included in a new technical report.~~

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 61000 (all parts), *Electromagnetic compatibility (EMC)*

~~IEC 61000-2-2:2002[2)], *Electromagnetic compatibility (EMC) – Part 2-2: Environment – Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems*~~

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1 Numbers in square brackets refer to the Bibliography.

~~2) This technical report also refers to the first edition of IEC 61000-2-2 (1990), *Electromagnetic compatability (EMC) – Part 2: Environment – Section 2: Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems*, since superseded by the second edition of that publication.~~

~~IEC 61000-3-2:2000[3], *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*[4]~~
~~Amendment 1 (2001)~~

~~IEC 61000-3-3:1994, *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage fluctuations and flicker in public low-voltage supply systems for equipment with rated current ≤ 16 A*[5]~~
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~~IEC 61000-3-4, *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*~~

~~IEC 61000-3-6, *Electromagnetic compatibility (EMC) – Part 3: Limits – Section 6: Assessment of emission limits for distorting loads in MV and HV power systems*~~

~~IEC 61000-3-11, *Electromagnetic compatibility (EMC) – Part 3-11: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems – Equipment with rated current ≤ 75 A and subjet to conditional connection*~~

~~IEC 61000-3-12, *Electromagnetic compatibility (EMC) – Part 3-12: Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase*~~

~~IEC 61000-4-13, *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*~~

~~3) This technical report also refers to the first edition of IEC 61000-3-2 (1995), *Electromagnetic compatability (EMC) – Part 3: Limits – Section 2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*, and its Amendment 1 (1995), since superseded by the second edition and its amendments of that publication.~~

~~4) A consolidated edition 2.2 exists, which includes IEC 61000-3-2:2000 and its Amendments 1 (2001) and 2 (2004).~~

~~5) A consolidated edition 1.1 exists, which includes IEC 61000-3-3:1994 and its Amendment 1 (2001), *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*~~

IEC TR 61000-1-4

Edition 2.0 2022-06

TECHNICAL REPORT

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