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TECHNICAL REPORT

colour inside

Electromagnetic compatibility – Part 1-8: General – Phase angles of harmonic current emissions and voltages in the public supply networks – Future expectations

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTROMAGNETIC COMPATIBILITY –

Part 1-8: General – Phase angles of harmonic current emissions and voltages in the public supply networks – Future expectations

FOREWORD

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IEC TR 61000-1-8, which is a Technical Report, has been prepared by subcommittee 77A: EMC – Low frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

The text of this Technical Report is based on the following documents:

Draft TR	Report on voting
77A/1002/DTR	77A/1012/RVDTR

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 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 compability*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://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- withdrawn,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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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

0.1 Series overview

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

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: 61000-6-1).

0.2 Purpose of this document

This part of IEC 61000 documents measurements at a number of public supply networks in Germany, and explains the analysis of the obtained data. Data were acquired under certain conditions. These conditions include categories of different network structures, load structures and power generation structures, especially including a review of networks with varying degrees of renewable energy. The loads in various networks include mainly

consumers, office buildings, and retail/shopping centres, and thus represent several categories of technologies in the input circuit of the electrical devices.

This document provides statistical evaluations aimed at quantifying the level of diversification of the prevailing harmonic current phase angles, and, where possible, to identify methods to reduce the overall emissions of dominant harmonics in the network.

For that purpose, the existing prevailing phase angle in the network at this time is analysed, and the type of prevailing phase angle expected in the future is evaluated. In particular, the potential changes in phase angle that can be expected, because of new technologies and/or network structures, are of interest. This would mean determining what harmonic compensation, if any, can be expected from various products. The goal is to determine or verify the existing phase angle (mainly of the 5^{th} harmonic) and to assess the possible influences of future developments – such as changes in lighting types and other electronic equipment.

This document is exclusively applicable to public low-voltage electricity supply networks.

ELECTROMAGNETIC COMPATIBILITY –

Part 1-8: General – Phase angles of harmonic current emissions and voltages in the public supply networks – Future expectations

1 Scope

The objective of this part of IEC 61000 is to provide information about the current conditions, and project future developments, of prevailing phase angles, predominantly for the 3rd and 5th harmonic currents, on public supply networks. This objective is accomplished by monitoring a number of networks, and efforts to forecast the effects of changes in technologies.

This document presents information to guide the discussion about the effectiveness of potential mitigation techniques and the generalisation of effects of the prevailing angle positions of selected current harmonics.

This document mainly deals with the phase angles of the 3rd and 5th harmonic currents, but also contains information about other harmonics.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
phase angle of I_5 related to the fundamental phase-to-neutral voltage U_{p1}
phase angle of the 5th harmonic current determined as described in Figure 1

[SOURCE: IEC 61000-3-12:2011, 3.16, modified – the reference to Figure 2 has been removed.]