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Electromagnetic compatibility (EMC) -
Part 4-27: Testing and measurement techniques - Unbalance, immunity test for equipment with input current not exceeding 16 A per phase

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In this Redline version, a vertical line in the margin shows where the technical content is modified by amendments 1 and 2. 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 61000-4-27 has been prepared by subcommittee 77A: Low-frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

It forms part 4-27 of IEC 61000. It has the status of basic EMC publication in accordance with IEC Guide 107.

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

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INTRODUCTION

This standard is part of 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 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 completed by a second number identifying the subdivision (example: 61000-6-1).

INTRODUCTION TO AMENDMENT 2

This amendment contains the following main changes in comparison with IEC 61000-4-27:2000/AMD1:2009:

The angles in Table 1 (test levels) suggest a three-phase system with a negative phase sequence while the intention is to have a positive phase sequence and thus the signs and values of all angles in Table 1 should be corrected. In addition, the value of ku2 of class 2, test 3 is 28 % instead of 25 %. The Table 1 is modified accordingly

Class X is defined as special and levels 2 and 3 refers to Annex D instead of 61000-2-4.

U_N is deleted from Table 1, and it is moved to the new Clause 3 (Terms, definitions, and abbreviations). The definition 3.5 U_N nominal phase to neutral voltage is added.

In addition, the definition of rise and fall time is added (as in 61000-4-11:2020).

The text in Note 1 in Table 1 is deleted and replaced by "U_b is lagging against U_a, and U_c is leading against U_a".

In Table 1 Add NOTE 2: The product committee may specify any test level; however, for equipment connected to public supply systems, it Is recommended that the levels should not be lower than those defined for class 2.

The sentence under Table 1 becomes NOTE 2 in the Table 1.

Some changes are introduced also in Table 2 (Characteristics of the generator). Main changes:

– Modified output current capability which must be able to provide a crest factor of at least 3 when U_N applied to calibration load.
– Modified voltage rise time adding (from 10 % to 90 %)
– Modified phase shifting
– Modified phase accuracy (put 50 Hz or 60 Hz).

In Clause 7 a sentence is added: The equipment under test (EUT) is set up at a steady mains voltage

In subclause 8.2 the last sentence "After each group of tests a full functional check shall be performed." Is deleted. In addition, Figure 2 is simplified.

In Clause 10 updated Figures 1 and 2 are included.

A new informative Annex B is proposed which includes two different calculation methods:

– method 1 does not require complex or vector calculus.
– method 2 uses phasors and matrices but is more compact.

Both methods are mathematically equivalent.

1 Scope and object

This part of IEC 61000 is a basic EMC (electromagnetic compatibility) publication. It considers immunity tests for electric and/or electronic equipment (apparatus and system) in its electromagnetic environment. Only conducted phenomena are considered, including immunity tests for equipment connected to public and industrial networks.

The object of this standard is to establish a reference for evaluating the immunity of electrical and electronic equipment when subjected to unbalanced power supply voltage.

This standard applies to 50 Hz/60 Hz three-phase powered electrical and/or electronic equipment with rated line current up to 16 A per phase.

This standard does not apply to equipment with three-phase plus neutral connection if that equipment operates as a group of single-phase loads connected between phase and neutral.

This standard does not apply to electrical and/or electronic equipment connected to a.c. 400 Hz distribution networks.

This standard does not include tests for the zero-sequence unbalance factor.

The immunity test levels required for a specific electromagnetic environment together with performance criteria are indicated in the product, product family or generic standards as applicable. This immunity test should be included in product, product family or generic standards when equipment is likely to show reduced performance or function when exposed to a supply voltage with voltage unbalance.

The verification of the reliability of electrical components (capacitors, motors, etc.) and long-term effects (greater than a few minutes) is not considered in this standard.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61000. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, 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. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

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

IEC 61000-2-4, *Electromagnetic compatibility (EMC) – Part 2: Environment – Section 4: Compatibility levels in industrial plants for low-frequency conducted disturbances*

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