

AS/NZS IEC 61000.4.13:2023
IEC 61000-4-13:2002+AMD1:2009+AMD2:2015 CSV



Australian/New Zealand Standard™

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



AS/NZS IEC 61000.4.13:2023

This Joint Australian/New Zealand Standard™ was prepared by Joint Technical Committee EL-034, Power Quality. It was approved on behalf of the Council of Standards Australia on 22 March 2023 and by the New Zealand Standards Approval Board on 05 April 2023.

This Standard was published on 5 May 2023.

The following are represented on Committee EL-034:

- Australian Chamber of Commerce and Industry
- Australian Industry Group
- Australian Information Industry Association
- Bureau of Steel Manufacturers of Australia
- Consumer Electronics Suppliers Association
- Consumers Federation of Australia
- Electrical Regulatory Authorities Council, Australia
- Electricity Engineers Association of New Zealand
- Energy Networks Australia
- Engineers Australia
- Lighting Council Australia
- National Measurement Institute
- New Zealand Coordinating Committee on Power & Telecommunication Systems
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This Standard was issued in draft form for comment as DR AS/NZS IEC 61000.4.13:2022.

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ISBN 978 1 76139 139 2

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Originated as AS/NZS 61000.4.13:2006.
Second edition 2012.
Revised and redesignated as AS/NZS IEC 61000.4.13:2023.



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Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-034, Power Quality, to supersede AS/NZS 61000.4.13:2012.

The objective of this document is to define the immunity test methods and range of recommended basic test levels for electrical and electronic equipment with rated current up to 16 A per phase at disturbance frequencies up to and including 2 kHz (for 50 Hz mains) and 2,4 kHz (for 60 Hz mains) for harmonics and interharmonics on low voltage power networks.

This document does not apply to electrical and electronic equipment connected to 16 2/3 Hz, or to 400 Hz a.c. networks. Tests for these networks will be covered by future standards.

The object of this document is to establish a common reference for evaluating the functional immunity of electrical and electronic equipment when subjected to harmonics and interharmonics and mains signalling frequencies. The test method documented in this part of AS/NZS 61000 describes a consistent method to assess the immunity of an equipment or system against a defined phenomenon.

The verification of the reliability of electrical components (for example capacitors, filters, etc.) is not in the scope of the present document. Long term thermal effects (greater than 15 min) are not considered in this document.

This document is identical with, and has been reproduced from, IEC 61000-4-13:2002+AMD1:2009+AMD2:2015 CSV, *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*.

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NOTES

CONTENTS

FOREWORD	3
INTRODUCTION	5
1 Scope and object	6
2 Normative references	6
3 Definitions	7
4 General	8
4.1 Description of the phenomenon	8
4.2 Sources	9
5 Test levels	10
5.1 Harmonics test levels	10
5.2 Test levels for interharmonics	11
6 Test instrumentation	12
6.1 Test generator	12
6.2 Verification of the characteristics of the generator	14
7 Test set up	14
8 Test procedures	15
8.1 Test procedure	15
8.2 Application of the test	15
9 Evaluation of test results	20
10 Test report	21
Annex A (informative) Impedance network between voltage source and EUT	26
Annex B (informative) Resonance point	27
Annex C (informative) Electromagnetic environment classes	28
Bibliography	29

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. 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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This consolidated version of the official IEC Standard and its amendments has been prepared for user convenience.

IEC 61000-4-13 edition 1.2 contains the first edition (2002-03) [documents 77A/368/FDIS and 77A/377/RVD], its amendment 1 (2009-05) [documents 77A/668/CDV and 77A/684/RVC] and its amendment 2 (2015-12) [documents 77A/904/FDIS and 77A/916/RVD].

This Final version does not show where the technical content is modified by amendments 1 and 2. A separate Redline version with all changes highlighted is available in this publication.

International Standard IEC 61000-4-13 has been prepared by subcommittee 77A: Low frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

This standard has the status of a basic EMC publication in accordance with IEC Guide 107.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

Annexes A, B, and C, are for information only.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication 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

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

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).

This part is an EMC basic standard which gives immunity requirements and test procedures related to harmonics and interharmonics including mains signalling at a.c. power port.

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

1 Scope and object

This part of IEC 61000 defines the immunity test methods and range of recommended basic test levels for electrical and electronic equipment with rated current up to 16 A per phase at disturbance frequencies up to and including 2 kHz (for 50 Hz mains) and 2,4 kHz (for 60 Hz mains) for harmonics and interharmonics on low voltage power networks.

It does not apply to electrical and electronic equipment connected to 16 2/3 Hz, or to 400 Hz a.c. networks. Tests for these networks will be covered by future standards.

The object of this standard is to establish a common reference for evaluating the functional immunity of electrical and electronic equipment when subjected to harmonics and interharmonics and mains signalling frequencies. The test method documented in this part of IEC 61000 describes a consistent method to assess the immunity of an equipment or system against a defined phenomenon. As described in IEC guide 107, this is a basic EMC publication for use by product committees of the IEC. As also stated in Guide 107, the IEC product committees are responsible for determining whether this immunity test standard should be applied or not, and if applied, they are responsible for determining the appropriate test levels and performance criteria. TC 77 and its sub-committees are prepared to co-operate with product committees in the evaluation of the value of particular immunity tests for their products.

The verification of the reliability of electrical components (for example capacitors, filters, etc.) is not in the scope of the present standard. Long term thermal effects (greater than 15 min) are not considered in this standard.

The levels proposed are more adapted for residential, commercial and light industry environments. For heavy industrial environments the product committees are responsible for the definition of a class X with the necessary levels. They have also the possibility of defining more complex waveforms for their own need. Nevertheless, the simple waveforms proposed have been mainly observed on several networks (flat curve more often for single phase system) and also on industrial networks (overswing curve more for three phase systems).

2 Normative references

The following referenced documents are indispensable for the application 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 60050(161), *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility*

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

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

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

3 Definitions

For the purposes of this part of IEC 61000, the following definitions and terms apply as well as the definitions of IEC 60050(161):

3.1

immunity

ability of a device, equipment or system to perform without degradation in the presence of an electromagnetic disturbance

[IEV 161-01-20]

3.2

harmonic (component)

component of order greater than 1 of the Fourier series of a periodic quantity

[IEV 161-02-18]

3.3

fundamental (component)

component of order 1 of the Fourier series of a periodic quantity

[IEV 161-02-17]

3.4

flat curve waveshape

waveform that follows a time related function in which each half-wave consists of three parts:

Part 1: starts from zero and follows a pure sine function up to the specified value;

Part 2: is a constant value;

Part 3: follows a pure sine function down to zero

3.5

overswing waveshape

waveform which consists of discrete values of the fundamental harmonic, the 3rd and the 5th harmonics with the specified phase shift

3.6

f_1

fundamental frequency

3.7

mains signalling frequencies

signal frequencies between harmonics for control and communication

3.8

EUT

equipment under test