AS/NZS IEC 61000.3.3:2023
IEC 61000-3-3:2013+AMD1:2017+AMD2:2021 CSV

Australian/New Zealand Standard™

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

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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 61000.3.3:2012.

The objective of this document is to specify the limitation of voltage fluctuations and flicker impressed on the public low-voltage system.

It specifies limits of voltage changes which may be produced by an equipment tested under specified conditions and gives guidance on methods of assessment.

This part of AS/NZS 61000 is applicable to electrical and electronic equipment having an input current equal to or less than 16 A per phase, intended to be connected to public low-voltage distribution systems of between 220 V and 250 V line to neutral at 50 Hz, and not subject to conditional connection.

Equipment which does not conform with the limits of this part of AS/NZS 61000 when tested with the reference impedance Z_{ref} of 6.4, and which therefore cannot be declared to conform with this part, may be retested or evaluated to show conformity with AS/NZS 61000.3.11. Part 3.11 is applicable to equipment with rated input current ≤ 75 A per phase and subject to conditional connection.

The tests according to this part are type tests. Particular test conditions are given in Annex A and the test circuit is shown in Figure 1.

This document is identical with, and has been reproduced from, IEC 61000-3-3:2013+AMD1:2017+AMD2:2021 CSV, *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.*

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The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

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CONTENTS

FOREWORD 4
INTRODUCTION 6
1 Scope 7
2 Normative references 7
3 Terms and definitions 8
4 Assessment of voltage changes, voltage fluctuations and flicker 10
4.1 Assessment of a relative voltage change, $d(t)$ 10
4.2 Assessment of the short-term flicker value, P_{st} 11
4.2.1 General 11
4.2.2 Flickermeter 11
4.2.3 Simulation method 11
4.2.4 Analytical method 11
4.2.5 Use of P_{st} = 1 curve 12
4.3 Assessment of long-term flicker value, P_{lt} 12
5 Limits 12
6 Test conditions 13
6.1 General 13
6.2 Measurement uncertainty 14
6.3 Test supply voltage 14
6.4 Reference impedance 14
6.5 Observation period 15
6.6 General test conditions 15
Annex A (normative) Application of limits and type test conditions for specific equipment 19
Annex B (normative) Test conditions and procedures for measuring d_{max} voltage changes caused by manual switching 29
Annex C (informative) Determination of steady state voltage and voltage change characteristics, as defined in IEC 61000-4-15:2010 30
Annex D (informative) Input relative voltage fluctuation ΔV/V for P_{st} = 1,0 at output [IEC/TR 61000-3-7:2008] 35
Bibliography 36

Figure 1 – Reference network for single-phase and three-phase supplies derived from a three-phase, four-wire supply 16
Figure 2 – Curve for P_{st} = 1 for rectangular equidistant voltage changes 17
Figure 3 – Shape factors F for double-step and ramp-voltage characteristics 17
Figure 4 – Shape factors F for rectangular and triangular voltage characteristics 18
Figure 5 – Shape factor F for motor-start voltage characteristics having various front times 18
Figure C.1 – Evaluation of $U_{hp}(t)$ 34

Table 1 – Assessment method 11
Table A.1 – Test conditions for hotplates 19
Table A.2 – Electrode parameters 25

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Full document details: AS NZS IEC 61000.3.3-2023

Table A.3 – Frequency factor R related to repetition rate "r" 26

Table C.1 – Test specification for d_c – d_{max} – $t_{d(t)}$ > 3,3 % (from Table 12 of IEC 61000-4-15: 2010) 33

Table C.2 – Test specification for d_c – d_{max} – $t_{d(t)}$ > 3,3 % (from Table 13 of IEC 61000-4-15: 2010) 33

Table D.1 – Input relative voltage fluctuation ΔV/V for P_{st} = 1,0 at output 35

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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

FOREWORD

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This consolidated version of the official IEC Standard and its amendments has been prepared for user convenience.

IEC 61000-3-3 edition 3.2 contains the third edition (2013-05) [documents 77A/809/FDIS and 77A/816/RVD], its amendment 1 (2017-05) [documents 77A/952/FDIS and 77A/960/RVD] and its amendment 2 (2021-03) [documents 77A/1075/CDV and 77A/1093/RVC] and its corrigendum (2022-01).

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.

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International Standard IEC 61000-3-3 has been prepared by subcommittee 77A: EMC – Low frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

This standard forms part 3-3 of IEC 61000 series of standards. It has the status of a product family standard.

This third edition constitutes a technical revision.

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

a) This edition takes account of the changes made in IEC 61000-4-15:2010.

This publication 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 compatibility (EMC)*, can be found on the IEC website.

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.

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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 9: Miscellaneous

Each part is further subdivided into sections which are to be published either as International Standards or as Technical Reports.

These standards and reports will be published in chronological order and numbered accordingly.

INTRODUCTION to the corrigendum

During the final editing of the text for IEC 61000-3-3:2013/AMD2:2021 (Edition 3), a mistake occurred and the sentence “Plt shall not be evaluated” is not displayed as a separate paragraph. As a result, this could lead to a wrong interpretation of the text and to wrong Pass/Fail results. This corrigendum is needed to clarify that the text “Plt shall not be evaluated” applies to all equipment in Clause A.16.

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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

1 Scope

This part of IEC 61000 is concerned with the limitation of voltage fluctuations and flicker impressed on the public low-voltage system.

It specifies limits of voltage changes which may be produced by an equipment tested under specified conditions and gives guidance on methods of assessment.

This part of IEC 61000 is applicable to electrical and electronic equipment having an input current equal to or less than 16 A per phase, intended to be connected to public low-voltage distribution systems of between 220 V and 250 V line to neutral at 50 Hz, and not subject to conditional connection.

Equipment which does not comply with the limits of this part of IEC 61000 when tested with the reference impedance Z_{ref} of 6.4, and which therefore cannot be declared compliant with this part, may be retested or evaluated to show conformity with IEC 61000-3-11. Part 3-11 is applicable to equipment with rated input current ≤ 75 A per phase and subject to conditional connection.

The tests according to this part are type tests. Particular test conditions are given in Annex A and the test circuit is shown in Figure 1.

NOTE 1 The limits in this standard relate to the voltage changes experienced by consumers connected at the interface between the public supply low-voltage network and the equipment user's installation. Consequently, if the actual impedance of the supply at the supply terminals of equipment connected within the equipment user's installation exceeds the test impedance, it is possible that supply disturbance exceeding the limits could occur.

NOTE 2 The limits in this standard are based mainly on the subjective severity of flicker imposed on the light from 230 V 60 W coiled-coil filament lamps by fluctuations of the supply voltage. For systems with nominal voltage less than 220 V line to neutral and/or frequency of 60 Hz, the limits and reference circuit values are under consideration.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC/TR 60725, *Consideration of reference impedances and public supply impedances for use in determining disturbance characteristics of electrical equipment having a rated current ≤ 75 A per phase*

IEC 60974-1, *Arc welding equipment – Part 1: Welding power sources*

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

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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 subject to conditional connection*

IEC 61000-4-15:2010, *Electromagnetic compatibility (EMC) – Part 4-15: Testing and measurement techniques – Flickermeter – Functional and design specifications*

3 Terms and definitions

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

3.1
flicker
impression of unsteadiness of visual sensation induced by a light stimulus whose luminance or spectral distribution fluctuates with time

[SOURCE: IEC 60050-161:1990, 161-08-13]

3.2
voltage change characteristic
d(t)
time function of the relative r.m.s. voltage change evaluated as a single value for each successive half period between zero-crossings of the source voltage, except during time intervals in which the voltage is in a steady-state condition for at least 1 s

Note 1 to entry: For detailed information about the evaluation of a voltage change characteristic and the definition of a steady state condition see Annex C and IEC 61000-4-15:2010.

3.3
d_c
maximum steady state voltage change during an observation period

Note 1 to entry: For detailed information about the calculation of d_c see Annex C and IEC 61000-4-15:2010.

3.4
d_{max}
maximum absolute voltage change during an observation period

Note 1 to entry: For detailed information about the calculation of d_{max} see Annex C and IEC 61000-4-15:2010.

3.5
T_{max}
maximum time duration during the observation period that the voltage deviation $d(t)$ exceeds the limit for d_c

Note 1 to entry: During a voltage change characteristic the time duration T_{max} is accumulated until a new steady state condition is established.

Note 2 to entry: The T_{max} limit evaluation in this standard is generally intended to evaluate the inrush current pattern of the equipment under test. Thus, as soon as a new steady state condition is established, the T_{max} evaluation is ended. When a new voltage change occurs that exceeds the limit for d_c, a new T_{max} evaluation is started. The maximum duration that $d(t)$ exceeds the limit for d_c for any of the individual T_{max} evaluations during the observation period, is used for the comparison against the T_{max} limit, and is reported for the test.

3.6
nominal test voltage
U_n
nominal test voltage used to calculate percentages for the various directly measured parameters

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Note 1 to entry: If no steady state condition is achieved during the observation period, U_n is used for the calculation of d_{max} and T_{max}.

Note 2 to entry: U_n is not necessarily equal to the nominal voltage of the public supply.

3.7
P_{st}
short-term flicker severity

Note 1 to entry: If not specified differently, the P_{st} evaluation time is 10 minutes. For the purpose of power quality surveys and studies, other time intervals may be used, and have to be defined in the index. For example a 1 minute interval should be written as $P_{st,1min}$.

3.8
P_{lt}
long-term flicker severity

$$P_{lt} = \sqrt[3]{\frac{\sum_{i=1}^{N} P_{st,i}^3}{N}}$$

where $P_{st,i}$ (i = 1, 2, 3, ...) are consecutive readings of the short-term severity P_{st}

Note 1 to entry: Unless otherwise specified, P_{lt} is calculated over discrete T_{long} periods. Each time a T_{long} period has expired, a new P_{lt} calculation is started.

3.9
flickermeter
instrument designed to measure any quantity representative of flicker

Note 1 to entry: Measurements are normally P_{st} and P_{lt} and may also include the directly measured parameters specified in 3.2 to 3.5.

[SOURCE: IEC 60050-161:1990, 161-08-14]

3.10
flicker impression time
t_f
value with a time dimension which describes the flicker impression of a voltage change characteristic

3.11
shape factor
F
value derived from the type of voltage fluctuation, such as a step, double step, or ramp pattern

Note 1 to entry: The shape factor is mainly needed when the analytical method is used to calculate P_{st}.

3.12
interface point
interface between a public supply network and a user's installation

3.13
conditional connection
connection of equipment requiring the user's supply at the interface point to have an impedance lower than the reference impedance Z_{ref} in order that the equipment emissions comply with the limits in this part

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