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Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current \( \leq 16 \) A per phase and not subject to conditional connection
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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 \( \leq 16 \) A per phase and not subject to conditional connection

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.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

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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 61000-3-3 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.

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 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 “Pit 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 “Pit shall not be evaluated” applies to all equipment in Clause A.16.
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 $Z_{\text{ref}}$ 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)
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


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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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*

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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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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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 $Z_{\text{ref}}$ 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 $\leq 75$ 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.

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IEC 61000-3-2, Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current $\leq 16$ A per phase)
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 $\leq 75$ 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