IEC 61000-4-15

Edition 2.0 2010-08
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BASIC EMC PUBLICATION
PUBLICATION FONDAMENTALE EN CEM

Electromagnetic compatibility (EMC) – Part 4-15: Testing and measurement techniques – Flickermeter – Functional and design specifications

Compatibilité électromagnétique (CEM) – Partie 4-15: Techniques d'essai et de mesure – Flickermètre – Spécifications fonctionnelles et de conception

IEC 61000-4-15:2010-08 RLV (en-fr)

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

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IEC 61000-4-15

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ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 4-15: Testing and measurement techniques – Flickermeter – Functional and design specifications

INTERPRETATION SHEET 1

This interpretation sheet has been prepared by subcommittee 77A: EMC – Low frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

The text of this interpretation sheet is based on the following documents:

FDIS	Report on voting
77A/966/FDIS	77A/973/RVD

Full information on the voting for the approval of this interpretation sheet can be found in the report on voting indicated in the above table.

Interpretation of requirements for rectangular voltage modulation with duty ratio according to IEC 61000-4-15: Electromagnetic compatibility (EMC) – Testing and measurement techniques – Flickermeter – Functional and design specifications.

IEC 61000-4-15 Ed 2 gives requirements in 6.8 for what is called “Rectangular voltage changes with 20 % duty cycle”. Table 11 provides the test specification for rectangular voltage changes with duty ratio. The requirements per Table 11 and the associated tests patterns caused some questions in the past year, and therefore IEC/SC77A/WG-2 wishes to clarify the title and interpretation per 6.8 which should be read as follows:

6.8 Rectangular voltage modulation for 20 % of the time

The amplitude of the test voltage U is rectangularly modulated with a 50 % duty cycle at 28 Hz. Every minute the amplitude modulation is switched on for 12 s and off for 48 s. Table 11 specifies the modulation depth in terms of voltage fluctuation (ΔU/U), which is further specified in Annex B. The transition time at the edges of the rectangular modulation shall be less than 0,5 ms.

The ten-minute P_{st} indication of the meter under test shall be 1,00 with a tolerance of ± 5 %.

Figure 1 shows a ΔU/U = 35 % for illustration purposes, as a 1 % to 2 % modulation would not be visible. Only 400 ms of the time axis is depicted, showing 200 ms on each side of the modulation on/off switching at 12 s.

NOTE The above text in 6.8 will be considered as a replacement for the original text when IEC 61000-4-15 is updated either through an amendment or replaced by a new edition.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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International Standard IEC 61000-4-15 has been prepared by subcommittee 77A: Low frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

IEC 61000-4-15 is based on work by the "Disturbances" Working Group of the International Union for Electroheat (UIE), on work of the IEEE, and on work within IEC itself.

It forms part 4-15 of the IEC 61000 series. It has the status of a basic EMC publication in accordance with IEC Guide 107.

This second edition cancels and replaces the first edition published in 1997 and its Amendment 1 (2003) and constitutes a technical revision. This new edition, in particular, adds or clarifies the definition of several directly measured parameters, so that diverging interpretations are avoided.

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

FDIS	Report on voting
77A/722/FDIS	77A/730/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 61000 series, under the general title *Electromagnetic compatibility (EMC)* can be found on the IEC website.

The committee has decided that the contents of this publication 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.

The contents of the corrigendum of March 2012 and Interpretation Sheet 1 of August 2017 have been included in this copy.

INTRODUCTION

IEC 61000-4 is a part of the IEC 61000 series, according to the following structure:

Part 1: General
General consideration (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, as technical specifications or technical reports, some of which have already been published as sections. Others are and will be published with the part number followed by a dash and completed by a second number identifying the subdivision (example: IEC 61000-6-1).

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 4-15: Testing and measurement techniques – Flickermeter – Functional and design specifications

1 Scope and object

This part of IEC 61000 gives a functional and design specification for flicker measuring apparatus intended to indicate the correct flicker perception level for all practical voltage fluctuation waveforms. Information is presented to enable such an instrument to be constructed. A method is given for the evaluation of flicker severity on the basis of the output of flickermeters complying with this standard.

The flickermeter specifications in this part of IEC 61000 relate only to measurements of 120 V and 230 V, 50 Hz and 60 Hz inputs. Characteristics of some incandescent lamps for other voltages are sufficiently similar to the values in Table 1 and Table 2, that the use of a correction factor can be applied for those other voltages. Some of these correction factors are provided in the Annex B. Detailed specifications for voltages and frequencies other than those given above, remain under consideration.

The object of this part of IEC 61000 is to provide basic information for the design and the instrumentation of an analogue or digital flicker measuring apparatus. It does not give tolerance limit values of flicker severity.

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 60068 (all parts), *Environmental testing*

IEC 61000-3-3, *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*

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 61010-1, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*

IEC 61326-1, *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements*

3 Parameters and symbols

3.1 Directly measured parameters and characteristics

3.1.1 General

The examples in Figure B.2a, Figure B.2b, Figure B.2c and Figure B.2d are intended to assist flickermeter manufacturers with the correct implementation for the determination of the parameters specified in this clause.

3.1.2 Half period rms value of the voltage

U_{hp}

Is the rms voltage of the mains supply voltage, determined over a half period, between consecutive zero crossings of the fundamental frequency voltage.

3.1.3 Half period rms value characteristics

$U_{hp}(t)$

Are the characteristics versus time of the half period rms value, determined from successive U_{hp} values, see also the examples in Annex B.

3.1.4 Relative half period rms value characteristics

$d_{hp}(t)$

The characteristics versus time of the half period rms values expressed as a ratio of the nominal voltage U_n.

$$d_{hp}(t) = U_{hp}(t)/U_n$$

3.1.5 Steady state voltage and voltage change characteristics

This subclause defines the evaluation of half cycle rms voltage values over time. Two basic conditions are recognized, being periods where the voltage remains in steady state and periods where voltage changes occur.

A steady state condition exists when the voltage U_{hp} remains within the specified tolerance band of ±0,2 % for a minimum of 100/120 half cycles (50 Hz/60 Hz) of the fundamental frequency.

At the beginning of the test, the average rms voltage, as measured during the last second preceding the test observation period, shall be used as the starting reference value for d_c, and $d_{hp}(t)$ calculations, as well as for the purpose of d_{max}, and $d(t)$ measurements. In the event that no steady state condition during given tests is established, the parameter d_c shall be reported to be zero.

As the measurement during a test progresses, and a steady state condition remains present, the sliding 1 s average value U_{hp_avg} of U_{hp} is determined, i.e. the last 100 (120 for 60 Hz) values of U_{hp} are used to compute U_{hp_avg}. This value U_{hp_avg} is subsequently used to determine whether or not the steady state condition continues, and it is also the reference for d_c and d_{max} determination in the event that a voltage change occurs.

For the determination of a new steady state condition "d_{c_i}" after a voltage change has occurred, a first value $d_{start\_i} = d_{hp}(t = t_{start})$ is used. Around this value a tolerance band of ±0,002 U_n (±0,2 % of U_n) is determined. The steady state condition is considered to be present if $U_{hp}(t)$ does not leave the tolerance band for 100 half consecutive periods (120 for 60 Hz) of the fundamental frequency.