INTERNATIONAL STANDARD

IEC 61000-3-11

First edition
2000-08

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

*This **English-language** version is derived from the original **bilingual** publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.*

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international cooperation on all questions concerning standardisation in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Standardization Organization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of the 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 National Committees.
3) The documents produced have the form of recommendations for international use published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard an the corresponding national or regional standard shall be clearly indicated in the latter.
5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61000-3-11 has been prepared by sub-committee 77A: Low-frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

This first edition of IEC 61000-3-11 is based on the contents of IEC Technical Report 61000-3-5 which was published in 1994 and is still relevant to equipment with a rated input current >75 A.

This standard has the status of a family product standard.

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

FDIS	Report on voting
77A/309/FDIS	77A/318/RVD

Full information on the voting for the approval of this section 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 3.

Annexes A and B are for information only.

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

- reconfirmed:
- withdrawn;
- replaced by a revised edition, or
- amended.

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 several parts published either as International Standards 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: 61000-3-11).

The scope of this part overlaps with that of IEC 61000-3-3 in that it is also applicable to equipment with a rated input current ≤16 A. However, it should be noted that equipment having a rated input current ≤16 A should first be tested for conformity with IEC 61000-3-3 before applying the evaluation techniques and measurement procedures specified in this part of IEC 61000.

Equipment which meets the requirements of IEC 61000-3-3 is not subject to conditional connection and therefore it is not subject to this part of IEC 61000.

The limits in this part 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. Therefore, it cannot be guaranteed that the user of equipment compliant with this standard will not experience supply disturbance within his own installation, as the impedance at the point of connection of the equipment to the supply within the installation may have an impedance greater than the test impedance.

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

1 Scope and object

This part of IEC 61000 is concerned with the emission of voltage changes, voltage fluctuations and flicker produced by equipment and impressed on the public low-voltage supply system.

It specifies the limits of voltage changes produced by equipment tested under specified conditions.

This part of IEC 61000 is primarily applicable to electrical and electronic equipment having a rated input current from 16 A up to and including 75 A, which is intended to be connected to public low-voltage distribution systems having nominal system voltages of between 220 V and 250 V, line-to-neutral at 50 Hz, and which is subject to conditional connection.

This part of IEC 61000 is also applicable to equipment within the scope of IEC 61000-3-3 that does not meet the limits when tested or evaluated with reference impedance Z_{ref} and is therefore subject to conditional connection. Equipment which meets the requirements of IEC 61000-3-3, is excluded from this part of IEC 61000.

Equipment tests made in accordance with this part of IEC 61000 are type tests.

NOTE The flicker limits specified in this part, being the same as those in IEC 61000-3-3, are based on the subjective severity of the flicker imposed on the light from 230 V/60 W coiled-coil filament lamps when subjected to fluctuations of the supply voltage. For systems with nominal voltages 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 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 ISO and IEC maintain registers of currently valid International Standards.

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

IEC 60725, *Considerations on reference impedances for use in determining the disturbance characteristics of household appliances and similar electrical equipment*

IEC 61000-3-3, *Electromagnetic compatibility (EMC) – Part 3: Limits – Section 3: Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤16 A*

3 Definitions

For the purposes of this part of IEC 61000 the terms and definitions given in IEC 60050(161) and IEC 61000-3-3, as well as the following apply:

3.1
reference impedance, Z_{ref}
the conventional impedance specified in IEC 61000-3-3 with a value in accordance with IEC 60725 which is used in the calculation and measurement of relative voltage change d, P_{st} and P_{lt} values

NOTE The resistive and reactive components of Z_{ref} are given in figure 1.

3.2
interface point
interface between a public supply network and a user's installation

3.3
conditional connection
connection of equipment which requires 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 standard

NOTE Meeting the voltage change limits is not the only condition for connection; emission limits for other phenomena such as harmonics, may also have to be satisfied.

3.4
service current capacity
the current per phase which can be taken continuously by the user at the interface point without exceeding the plant ratings used by the supply authority in the design of its system

NOTE In practice the service current capacity is the rating of the main service fuse or overcurrent protection setting of the circuit breaker at the interface point. In cases where supply authorities declare supply capacities in volt-amperes, the current per phase may be deduced for single phase supplies by dividing the volt-amperes by the declared phase voltage, and for three-phase supplies by dividing it by √3 times the declared line voltage.

4 Requirements

If equipment complies with the requirements of IEC 61000-3-3 and therefore is not subject to conditional connection, it may be declared so by the manufacturer in documentation made available to users before purchase.

Equipment which does not meet the limits of IEC 61000-3-3, when tested or evaluated with reference impedance Z_{ref}, is subject to conditional connection, and the manufacturer shall either:

a) determine the maximum permissible system impedance Z_{max} at the interface point of the user's supply in accordance with 6.2, declare Z_{max} in the equipment instruction manual and instruct the user to determine in consultation with the supply authority, if necessary, that the equipment is connected only to a supply of that impedance or less, or

b) test the equipment in accordance with 6.3 and declare in the equipment instruction manual that the equipment is intended for use only in premises having a service current capacity ≥100 A per phase, supplied from a distribution network having a nominal voltage of 400/230 V, and instruct the user to determine in consultation with the supply authority, if necessary, that the service current capacity at the interface point is sufficient for the equipment.

The equipment shall be clearly marked as being suitable for use only in premises having a service current capacity equal to or greater than 100 A per phase.

NOTE 1 In the case of option a), restrictions to connection may be imposed by the supply authority on the use of equipment if the actual system impedance at the interface point on the user's premises, Z_{act} , exceeds Z_{max}.

NOTE 2 In the case of option b), a new symbol (IEC 60417-5855) is under consideration for the purpose of marking equipment.

NOTE 3 For options a) and b), if the supply capacity and/or the actual system impedance Z_{act} have been declared to, or measured by, the user, this information may be used to assess the suitability of equipment without reference to the supply authority.

5 Limits

The limits shall be applicable to voltage fluctuations and flicker at the supply terminals of the equipment under test, measured or calculated according to clause 4 under test conditions described in clause 6. Tests made to prove the compliance with the limits are considered to be type tests.

The following limits apply:

– the value of the short-term flicker indicator, P_{st} shall not be greater than 1,0;
– the value of the long-term flicker indicator, P_{lt} shall not be greater than 0,65;
– the value of d(t) during a voltage change shall not exceed 3,3 % for more than 500 ms;
– the relative steady-state voltage change, d_c, shall not exceed 3,3 %;
– the maximum relative voltage change d_{max}, shall not exceed:

a) 4 % without additional conditions;

b) 6 % for equipment with:

– manual switching, or
– automatic switching more frequently than twice per day and having a delayed restart (the delay being not less than a few tens of seconds) or,
– manual restart after a power supply interruption.

NOTE The cycling frequency will be further limited by the P_{st} and P_{lt} limit. For example: a d_{max} of 6 % producing a rectangular voltage change characteristic twice per hour will give a P_{lt} of about 0,65.

c) 7 % for equipment which

– is attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawnmowers, portable tools such as electric drills); or
– is switched on automatically, or is intended to be switched on manually, no more than twice per day and has a delayed restart (the delay being not less than a few tens of seconds) or manual restart after a power supply interruption.