

INTERNATIONAL STANDARD



BASIC EMC PUBLICATION

**Electromagnetic compatibility (EMC) –
Part 4-30: Testing and measurement techniques – Power quality measurement
methods**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMAGNETIC COMPATIBILITY (EMC) –

**Part 4-30: Testing and measurement techniques –
Power quality measurement methods**

FOREWORD

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International Standard IEC 61000-4-30 has been prepared by subcommittee 77A: EMC – Low-frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

This standard forms part 4-30 of IEC 61000. It has the status of a basic EMC publication in accordance with IEC Guide 107.

This third edition cancels and replaces the second edition published in 2008. This edition constitutes a technical revision.

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

- a) the measurement method for current, previously informative, is now normative with some changes;
- b) the measurement method for RVC (rapid voltage change) has been added;
- c) the measurement method for conducted emissions in the 2 kHz to 150 kHz range has been added in informative Annex C;
- d) underdeviation and overdeviation parameters are moved to informative Annex D;
- e) Class A and Class S measurement methods are defined and clarified, while Class B is moved to informative Annex E and considered for future removal;
- f) measurement methods continue in this standard, but responsibility for influence quantities, performance, and test procedures are transferred to IEC 62586-2.

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

FDIS	Report on voting
77A/873/FDIS	77A/878/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 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 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- withdrawn,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 December 2016 have been included in this copy.

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

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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 completed by a second number identifying the subdivision (example: 61000-6-1).

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 4-30: Testing and measurement techniques – Power quality measurement methods

1 Scope

This part of IEC 61000-4 defines the methods for measurement and interpretation of results for power quality parameters in ~~50/60 Hz~~ a.c. power supply systems **with a declared fundamental frequency of 50 Hz or 60 Hz.**

Measurement methods are described for each relevant parameter in terms that give reliable and repeatable results, regardless of the method's implementation. This standard addresses measurement methods for in-situ measurements.

Measurement of parameters covered by this standard is limited to ~~voltage conducted phenomena that can be conducted~~ in power systems. The power quality parameters considered in this standard are power frequency, magnitude of the supply voltage, flicker, supply voltage dips and swells, voltage interruptions, transient voltages, supply voltage unbalance, voltage harmonics and interharmonics, mains signalling on the supply voltage, rapid voltage changes, **and current measurements. Emissions in the 2 kHz to 150 kHz range are considered in Annex C (informative), and over- and underdeviations are considered in Annex D (informative).** Depending on the purpose of the measurement, all or a subset of the phenomena on this list may be measured.

NOTE 1 ~~Information about current parameters may be found in A.3 and A.5. Test methods for verifying compliance with this standard can be found in IEC 62586-2.~~

~~This standard gives measurement methods and appropriate performance requirements, but does not set thresholds.~~

NOTE 2 The effects of transducers inserted between the power system and the instrument are acknowledged but not addressed in detail in this standard. ~~Precautions on installing monitors on live circuits are addressed.~~ Guidance about effects of transducers ~~may can~~ be found in ~~IEC 61557-12~~ IEC TR 61869-103.

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 60050-161, International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility~~

IEC 60050 (all parts), *International Electrotechnical Vocabulary (IEV)* (available at www.electropedia.org)

~~IEC 61000-2-2:2002, Electromagnetic compatibility (EMC) – Part 2-2: Environment – Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems~~

IEC 61000-2-4, *Electromagnetic compatibility (EMC) – Part 2-4: Environment – Compatibility levels in industrial plants for low-frequency conducted disturbances*

IEC 61000-3-8, *Electromagnetic compatibility (EMC) – Part 3: Limits – Section 8: Signalling on low-voltage electrical installations – Emission levels, frequency bands and electromagnetic disturbance levels*

~~IEC 61000-4-4:2004, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*~~

IEC 61000-4-7:2002, *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*
IEC 61000-4-7:2002/AMD1:2008

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

IEC 61180 (all parts), *High-voltage test techniques for low voltage equipment*

IEC 62586-1, *Power quality measurement in power supply systems – Part 1: Power quality instruments (PQI)*

IEC 62586-2, *Power quality measurement in power supply systems – Part 2: Functional tests and uncertainty requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-161, as well as the following apply.

3.1

channel

individual measurement path through an instrument

Note 1 to entry: “Channel” and “phase” are not the same. A voltage channel is by definition the difference in potential between 2 conductors. Phase refers to a single conductor. On polyphase systems, a channel may be between 2 phases, or between a phase and neutral, or between a phase and earth, or between neutral and earth.

3.2

~~Coordinated Universal Time-UTC~~

~~time scale which forms the basis of a coordinated radio dissemination of standard frequencies and time signals. It corresponds exactly in rate with international atomic time, but differs from it by an integral number of seconds.~~

~~NOTE 1—Coordinated universal time is established by the International Bureau of Weights and Measures (BIPM) and the International Earth Rotation Service (IERS).~~

~~NOTE 2—The UTC scale is adjusted by the insertion or deletion of seconds, so called positive or negative leap seconds, to ensure approximate agreement with UT1.~~

~~[IEV 713-05-20]~~

3.2

declared input voltage

U_{din}

value obtained from the declared supply voltage by a transducer ratio

3.3 declared supply voltage

U_c
normally the nominal voltage U_n of the system

Note 1 to entry: If, by agreement between the supplier and the customer, a voltage different from the nominal voltage is applied to the terminals, then this voltage is the declared supply voltage U_c .

3.4 dip threshold

voltage magnitude specified for the purpose of detecting the start and the end of a voltage dip

3.5 flagged data

~~data that has been marked to indicate that its measurement or its aggregation may have been affected by interruptions, dips, or swells~~

for any measurement time interval in which interruptions, dips or swells occur, the marked measurement results of all other parameters made during this time interval

~~Note 1 to entry: Flagging enables other methods that may prevent a single event from being counted as several different types of events. Flagging is supplemental information about a measurement or aggregation. Flagged data is not removed from the data set. In some applications, flagged data may be excluded from further analysis but in other applications, the fact that data was flagged may be unimportant. The user, application, regulation, or other standards determine the use of flagged data. For some applications, this 'marked' or 'flagged' data may be excluded from further analysis, for example. See 4.7 for further explanation.~~

3.6 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]

3.6.1

P_{st}
short-term flicker evaluation based on an observation period of 10 min

[SOURCE: IEC 61000-4-15]

3.6.2

P_{lt}
long-term flicker evaluation

[SOURCE: IEC 61000-4-15]

3.7 fundamental component

component whose frequency is the fundamental frequency

~~[IEV 101-14-49, modified]~~

3.8 fundamental frequency

frequency in the spectrum obtained from a Fourier transform of a time function, to which all the frequencies of the spectrum are referred

~~[IEV 101-14-50, modified]~~