

TECHNICAL SPECIFICATION



Assessment of power quality – Characteristics of electricity supplied by public networks



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CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	8
3 Terms and definitions	9
4 Recommended values for power quality indices.....	17
4.1 General.....	17
4.2 Frequency deviation.....	19
4.3 Supply voltage deviation	19
4.3.1 General	19
4.3.2 Low voltage systems	19
4.3.3 Medium voltage systems.....	20
4.3.4 High voltage systems.....	20
4.4 Voltage unbalance	20
4.5 Flicker.....	21
4.6 Harmonic and interharmonic voltage	21
4.6.1 General	21
4.6.2 Low voltage systems	21
4.6.3 Medium voltage systems.....	22
4.6.4 High voltage systems.....	23
4.7 Voltage dip	24
4.8 Voltage swell	25
4.9 Voltage interruption.....	25
4.10 Mains communicating voltage	26
4.11 Rapid voltage change	26
4.12 Transient overvoltage	27
4.12.1 Low voltage systems	27
4.12.2 Medium and high voltage systems	27
5 Objectives and methods for power quality assessment	27
5.1 General.....	27
5.2 Site power quality assessment.....	28
5.2.1 General	28
5.2.2 Continuous phenomena	28
5.2.3 For discontinuous phenomena (single event).....	30
5.3 System aspect power quality assessment	31
5.3.1 General	31
5.3.2 For continuous phenomena.....	31
5.3.3 For discontinuous phenomena (events)	31
Annex A (informative) Examples of profiles for power quality specification.....	34
A.1 General.....	34
A.2 LV and MV public distribution networks in European countries.....	34
A.3 LV, MV and HV power supply system in China	35
A.4 Example of a transmission system in Canada	36
A.5 Examples of profiles in Australia	37
Annex B (informative) Additional information on power quality assessments	38

B.1	Weekly percentile values assessed on a daily sliding basis.....	38
B.2	Example on system aspect continuous disturbance evaluation.....	39
B.3	Aggregation method used for events.....	39
B.3.1	General.....	39
B.3.2	Time aggregation.....	39
Annex C (informative)	Main impact of poor power quality.....	42
C.1	General.....	42
C.2	Harmonic distortion.....	42
C.3	Voltage unbalance.....	42
C.4	Voltage deviation.....	43
C.5	Frequency deviation.....	43
C.6	Voltage fluctuation.....	43
C.7	Flicker.....	43
C.8	Voltage dip (or voltage sag).....	43
C.9	Transient overvoltages.....	43
Annex D (informative)	Power quality issues related to distributed generation and micro-grids.....	44
D.1	General.....	44
D.2	Voltage deviation.....	44
D.3	Harmonics.....	44
D.4	DG magnetic bias (DC current injection).....	44
D.5	Voltage fluctuation and flicker.....	45
D.6	High frequency conducted disturbances.....	45
Annex E (informative)	Methods to maintain and improve power quality.....	46
E.1	General.....	46
E.2	Voltage deviation.....	46
E.3	Harmonics.....	46
E.4	Flicker.....	47
E.5	Voltage unbalance.....	47
E.6	Voltage dip/swell/short time interruption.....	48
Annex F (informative)	Relation between power quality and EMC.....	49
F.1	General.....	49
F.2	Differences between power quality and compatibility levels.....	49
F.3	Example of power quality level versus compatibility level.....	50
Annex G (informative)	Other phenomena.....	53
G.1	General.....	53
G.2	Level behaviour over time.....	53
G.3	Duration.....	53
G.4	Periodicity.....	53
G.5	Bandwidth.....	54
Annex H (informative)	Role of stakeholders for power quality management – Coordination of the parties involved.....	55
H.1	General.....	55
H.2	Network operator – Network user.....	55
H.3	Network user – Equipment supplier.....	55
H.4	Network operator – Equipment supplier.....	56
Bibliography	57

Figure 1 – Mains communicating voltages recommended values in percent of U_N used in public LV networks (or U_C in public MV networks)	26
Figure 2 – Example for illustrating voltage <i>THD</i> assessment result trends	30
Figure 3 – Example showing information of single event assessment.....	31
Figure B.1 – Comparison of two methods of assessing weekly 95 th percentile values.....	38
Figure B.2 – Example for illustrating the differences resulted by time aggregation method	40
Figure B.3 – Example of time sequence of voltage dips that can be aggregated in two different ways	41
Figure F.1 – Application points in a LV system (example)	50
Figure F.2 – Relation between disturbance levels (schematic significance only)	50
Figure F.3 – Cumulative distribution of all <i>THD</i> values recorded at 30 points of supply of the LV system, during one week	51
Figure F.4 – Weekly 95 th percentile <i>THD</i> values evaluated at each monitored LV point of supply.....	52
Table 1 – Classification of electromagnetic phenomena addressed by power quality indices	8
Table 2 – Flicker severity P_{ft} recommended values	21
Table 3 – Recommended values of individual harmonic voltages at the low voltage points of supply for orders up to 50 given in percent of the fundamental voltage U_1	22
Table 4 – Recommended values of individual harmonic voltages at the medium voltage points of supply for orders up to 50 given in percent of the fundamental voltage U_1	23
Table 5 – Indicative values of individual harmonic voltages at the high voltage points of supply given in percent of the fundamental voltage U_1	24
Table 6 – Site power quality assessment methods	29
Table 7 – Example of single event assessment.....	30
Table 8 – List of individual events measured at a single monitoring site.....	32
Table 9 – <i>SARFI-X</i> indices coming out of Table 8	32
Table 10 – Magnitude-duration table format	33
Table A.1 – Examples of profiles in European countries.....	34
Table A.2 – Examples of profiles in China.....	35
Table A.3 – Examples of profiles in Canada.....	36
Table A.4 – Examples of profiles in Australia	37
Table B.1 – Listing of system power quality evaluation	39

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ASSESSMENT OF POWER QUALITY – CHARACTERISTICS
OF ELECTRICITY SUPPLIED BY PUBLIC NETWORKS**

FOREWORD

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- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical Specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 62749, which is a technical specification, has been prepared by IEC technical committee 8: System aspects of electrical energy supply.

The text of this Technical Specification is based on the following documents:

Draft TS	Report on voting
8/1512/DTS	8/1524/RVDTS

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

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

This second edition cancels and replaces the first edition published in 2015. This edition constitutes a technical revision.

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

- a) minimum number of remaining data for weekly analysis,
- b) improvement of the compatibility between EN 50160 and IEC TS 62749,
- c) further explanation of the conception of daily sliding window,
- d) further explanation of the aggregation method used for events,
- e) further explanation of the relation between Power Quality and EMC,
- f) addition of a new definition of mains communicating system (MCS),
- g) addition of a new Annex G: Other phenomena,
- h) transfer of the main content of IEC TR 62510 to IEC TS 62749.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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

The description of electricity is of fundamental importance within electricity supply systems. In the past, its characteristics depended less on its generation than on the way in which it was transported by networks and being used by the equipment of the multiple users. Faults or other events such as short-circuit and lightning strikes occurring within users' installations or public networks also disturb or degrade it.

Nowadays, Smart Grid construction and massive deployment of renewable energy sources increase the complexity of power quality management. For more information about power quality issues related to distributed generation and micro-grids, refer to Annex D.

NOTE For more information about role of stakeholders for power quality management, see Annex H.

There is a need for a common set of power quality (PQ) indices and measurement methods in order to allow different system operators to measure and report power quality in a consistent manner.

Regarding the limits or levels of power quality, the situation differs. Historically, the electrical systems in different countries/regions have been designed in different ways to cater for national/regional variations like different geographic, climatic or commercial conditions, etc. It is thus essential that any set of internationally agreed power quality limits or levels also recognize these differences, which depends namely on the system configuration, the transfer characteristics between the different voltage levels (attenuation or amplification), the actual disturbance levels on the system, etc.

Also, the quality of power is not absolute. Optimizing power quality should be carried out in a cost-effective manner to balance network user power quality requirements and willingness to pay for it with power quality supply costs.

Therefore, some of the objectives recommended hereafter allow for a range of values, or options, while still ensuring the coordination of disturbance levels between different parts of the system or voltage levels.

Then, the requirements to be applied can be expressed by the association of the IEC Power Quality framework from the normative part of this document and profiles. Examples of profiles are given in Annex A.

ASSESSMENT OF POWER QUALITY – CHARACTERISTICS OF ELECTRICITY SUPPLIED BY PUBLIC NETWORKS

1 Scope

This Technical Specification specifies the expected characteristics of electricity at the point of supply of public low, medium and high voltage, 50 Hz or 60 Hz, networks, as well as power quality assessment methods.

NOTE 1 The boundaries between the various voltage levels can be different for different countries/regions. In the context of this TS, the following terms for system voltage are used:

- low voltage (LV) refers to $U_N \leq 1$ kV;
- medium voltage (MV) refers to 1 kV $< U_N \leq 35$ kV;
- high voltage (HV) refers to 35 kV $< U_N \leq 230$ kV.

NOTE 2 Because of existing network structures, in some countries/regions, the boundary between medium and high voltage can be different.

This document applies to the phenomena listed in Table 1.

**Table 1 – Classification of electromagnetic phenomena
addressed by power quality indices**

Continuous phenomena	Discontinuous phenomena – Events	Other phenomena
FREQUENCY DEVIATION	SUPPLY INTERRUPTION	MAINS COMMUNICATING VOLTAGES
SUPPLY VOLTAGE DEVIATION	VOLTAGE DIP	
VOLTAGE UNBALANCE	VOLTAGE SWELL	
HARMONIC VOLTAGE	TRANSIENT OVERVOLTAGE	
INTERHARMONIC VOLTAGE	RAPID VOLTAGE CHANGE	
FLICKER (VOLTAGE FLUCTUATION)		

NOTE 3 Specification of related measurement methods can be found in IEC 61000-4-30.

NOTE 4 Specification of the performance of related measuring instruments can be found in IEC 62586.

While power quality is related to EMC in a number of ways, especially because compliance with power quality requirements depends on the control of cumulative effect of electromagnetic emission from all/multiple equipment and/or installations, this document is not an EMC publication (see also Annex F).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60038, *IEC standard voltages*

IEC 60364-4-44, *Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*

IEC 60364-5-53, *Low-voltage electrical installations – Part 5-53: Selection and erection of electrical equipment – Devices for protection for safety, isolation, switching, control and monitoring*

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 61000-2-2:2002/AMD1:2017

IEC 61000-2-2:2002/AMD2:2018

IEC 61000-2-12, *Electromagnetic compatibility (EMC) – Part 2-12: Environment – Compatibility levels for low-frequency conducted disturbances and signalling in public medium-voltage power supply systems*

IEC TR 61000-2-14, *Electromagnetic compatibility (EMC) – Part 2-14: Environment – Overvoltages on public electricity distribution networks*

IEC 61000-4-30:2015, *Electromagnetic compatibility (EMC) – Part 4-30: Testing and measurement techniques – Power quality measurement methods*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

NOTE Terms are listed in alphabetical order.

3.1 code

collection of rules concerning rights and duties of the parties involved in a certain part of the electric power system

Note 1 to entry: For example: grid code, distribution code, code in electric power system.

[SOURCE: IEC 60050-617:2009, 617-03-03, modified – "code in electric power system" has been added in the Note to entry]

3.2 connection agreement

agreement entered between the system operator and a system user which governs the procedure and conditions for connection

[SOURCE: IEC 60050-617:2009, 617-04-03]

3.3 declared supply voltage

U_c

supply voltage agreed by the network operator and the network user