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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

FOREWORD

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IEC TS 62749 has been prepared by IEC technical committee 8: System aspects of electrical energy supply. It is a Technical Specification.

This third edition cancels and replaces the second edition published in 2020. This edition constitutes a technical revision.

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

a) clarification that harmonic orders recommended in this document are up to 40th;
   4.6 is modified accordingly;
b) iteration that this document does not apply for systems operated above 230 kV;
c) deletion of Annex C;
d) improvement of 4.10;

e) update of profiles and addition of new profiles;

f) modifications to align with EN 50160:2022 and EN 50160:2022/AMD1:2025.

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

Draft	Report on voting
8/1779/DTS	8/1800/RVDTS

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

The language used for the development of this Technical Specification is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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

– reconfirmed,

– withdrawn, or

– revised.

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 C.

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

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 or regions have been designed in different ways to cater for national or 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.

1 Scope

This document, which is a 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.

This document does not apply for systems operated above 230 kV.

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

– low voltage (LV) refers to U_N ≤ 1 kV;

– medium voltage (MV) refers to 1 kV < U_N ≤ 35 kV;

– high voltage (HV) refers to 35 kV < U_N ≤ 230 kV.

Because of existing network structures, in some countries or 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 1 Specification of related measurement methods can be found in IEC 61000-4-30.

NOTE 2 Specification of the performance of related measuring instruments can be found in the IEC 62586 series.

NOTE 3 For information on power quality phenomena at low voltage direct current (LVDC) network, refer to IEC TR 63282.

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 or multiple equipment and installations, this document is not an EMC publication (see also Annex E).

2 Normative references

There are no normative references in this document.

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