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Power quality management

Part 100: Impact of power quality issues on electric equipment and power system

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National foreword

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Power quality management – Part 100: Impact of power quality issues on electric equipment and power system

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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POWER QUALITY MANAGEMENT –

Part 100: Impact of power quality issues on electrical equipment and power system

FOREWORD

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IEC TR 63222-100 has been prepared by IEC technical committee 8: System aspects of electrical energy supply. It is a Technical Report.

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

Draft	Report on voting
8/1648/DTR	8/1660/RVDTR

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 Report 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.

A list of all parts in the IEC 63222 series, published under the general title *Power quality management*, can be found on the IEC website.

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- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

The impacts of power quality issues increasingly attract much attention with modern industrial development. The integration of nonlinear loads, such as power-electronic based equipment, electric arc furnace, electric locomotive, etc., and faults or other events such as short-circuit and lightning strikes directly or indirectly cause power quality issues.

If public supply system power quality is not within the reasonable range defined in IEC TS 62749, and/or the demand-side power quality is not appropriately managed (e.g. IEC TR 63191) and/or the equipment immunity does not accommodate the expected environment, the performance of equipment may be impacted, likely causing malfunction, maloperation, or damage, and likewise the power system itself.

On the other hand, the quality of power is not absolute. Regarding the levels of power quality, the situation differs. So called “poor” power quality level for one grid may be acceptable or good for another internal application depending on the system configuration, the transfer characteristics between the different voltage levels (attenuation or amplification), the immunity of the equipment /installations/appliances, the actual disturbance levels on the system, etc.

In terms of power quality, the situation in micro-grid on islanding mode, off grid, mini-grid or weak grid may differ from that in public supply system. The level of power quality may worsen even far outside the recommended values defined by IEC TS 62749. In those forementioned grids, appliances may need to be better designed for immunity to power quality issues.

This document, which is a Technical Report, collects relevant information on power quality impact from, e.g., CIGRE reports, case study, research findings, etc., in order to uncover the mechanism of how electrical equipment/installations are impacted under specific power quality condition, as well as to fully understand the reasons of power quality management.

This document focuses on the public supply system. Notionally, the mechanisms of how electrical equipment/installations/system are impacted by power quality disturbances are applicable for so-called weak grids.

The contents of this document can help network users and equipment suppliers make rational investments and actively cooperate with network operators to take specific measures to improve power quality.

The contents of this document can also support IEC TR 63222-101, namely, power quality management-power quality data applications.

POWER QUALITY MANAGEMENT –

Part 100: Impact of power quality issues on electrical equipment and power system

1 Scope

This part of IEC 63222, which is a Technical Report, collects relevant information on power quality impacts from, e.g., CIGRE reports, case studies, research findings, etc., in order to uncover the mechanisms of how electrical equipment/installations/system are impacted by power quality disturbances, as well as to fully understand the guidelines for power quality management.

The contents of this document aim to help network operators, network users and equipment suppliers make rational investments and actively cooperate to manage power quality and keep it consistent with relevant EMC standards.

NOTE 1 The boundaries between the various voltage levels may be different for different countries/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

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

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

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

3.1
electricity
set of phenomena associated with electric charges and electric currents

Note 1 to entry: In the context of electric power systems, electricity is often described as a product with particular characteristics.

[SOURCE: IEC 60050-121:1998, 121-11-76]

3.2
flicker
impression of unsteadiness of visual sensation induced by a light stimulus whose luminance or spectral distribution fluctuates with time