



BSI Standards Publication

Power quality management

Part 1: General guidelines

National foreword

This Published Document is the UK implementation of IEC TS 63222-1:2021.

The UK participation in its preparation was entrusted to Technical Committee GEL/8, Systems Aspects for Electrical Energy Supply.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

This publication is not to be regarded as a British Standard.

© The British Standards Institution 2022
Published by BSI Standards Limited 2022

ISBN 978 0 560 99849 2

ICS 29.020

Compliance with a Published Document cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 January 2022.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------



IEC TS 63222-1

Edition 1.0 2021-12

TECHNICAL SPECIFICATION



**Power quality management –
Part 1: General guidelines**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.020

ISBN 978-2-8322-1061-4

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	8
3 Terms, definitions and abbreviated terms	10
3.1 Terms and definitions.....	10
3.2 Abbreviated terms.....	12
4 Use cases list.....	13
4.1 List of business use case and business roles of the domains.....	14
4.2 List of system use cases and system roles.....	15
5 Provisions	16
5.1 Power quality assessment.....	16
5.1.1 General	16
5.1.2 Monitoring assessment.....	17
5.1.3 Monitoring assessment process.....	17
5.1.4 Predicted assessment.....	18
5.1.5 Predicted assessment process	18
5.1.6 Background description and analysis.....	18
5.1.7 Disturbance anticipation	18
5.1.8 Impacts analysis.....	19
5.2 PQ monitoring system.....	19
5.2.1 General	19
5.2.2 Monitoring points.....	19
5.2.3 Monitoring equipment.....	20
5.2.4 Related information and communication system	20
5.3 Economical assessment.....	20
5.3.1 General	20
5.3.2 Economical assessment of PQ provisions.....	21
5.3.3 Economical assessment of unsatisfactory PQ objectives/results	22
5.4 PQ requirement	23
5.5 Mitigation/avoidance shooting.....	23
5.5.1 Total requirements.....	23
5.5.2 Power quality mitigation scheme.....	24
Annex A (normative) Use case.....	26
A.1 Business use cases	26
A.1.1 BUC 1: Manage power quality over the grid.....	26
A.1.2 BUC 2: Manage complaints on power quality over the network	28
A.1.3 BUC 3: Provide reports on network power quality	36
A.1.4 BUC 4: Take into account power quality constraints in connecting a user to the grid	42
A.2 System UCs.....	48
A.2.1 SUC1: Measure power quality on a specific point of the network.....	48
A.2.2 SUC2: Monitor power quality on the network.....	60
A.2.3 SUC3: Assess the emission limit related to power quality technical parameters in power system.....	69
Annex B (informative) Main contents and requirements of power quality monitoring assessment report.....	74

B.1	Overview.....	74
B.2	Basic information of the assessment object.....	74
B.3	Basic information of power grid.....	74
B.4	Basis of assessment and standard.....	74
B.5	Monitoring instructions.....	74
B.6	Analysis and conclusion.....	74
B.7	Measures and suggestions (as required).....	74
B.8	Attachments.....	74
Annex C (informative) Main contents and requirements of power quality predicted assessment report.....		75
C.1	Overview.....	75
C.2	Basic information of the assessment object.....	75
C.3	Basic situation of power grid.....	75
C.4	Basis of assessment and standard.....	75
C.5	Brief description of assessment method.....	75
C.6	Calculation and analysis.....	76
C.7	Measures and suggestions (as required).....	76
C.8	Conclusion.....	76
C.9	Attachments.....	76
Annex D (informative) Economic data of power quality.....		77
D.1	Data structure.....	77
D.2	Basic data of economic cost of power users.....	77
D.3	Basic data of economic cost of public distribution network.....	78
D.4	Power quality related monitoring data.....	78
D.5	Equipment and system parameters.....	79
Bibliography.....		80
IEC references.....		80
Non-IEC references.....		81
Figure 1 – Organisation of the use cases.....		13
Figure 2 – Overview of the power quality management main functions.....		17
Table 1 – Content of IEC TS 63222-1.....		8
Table 2 – Abbreviations of IEC TS 63222-1.....		12
Table 3 – Lists of business use cases.....		14
Table 4 – Business roles of IEC TS 63222-1.....		15
Table 5 – Lists of the system use cases.....		15
Table 6 – Lists of system roles.....		16

INTERNATIONAL ELECTROTECHNICAL COMMISSION

POWER QUALITY MANAGEMENT –**Part 1: General guidelines****FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of 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 IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC TS 63222-1 has been prepared by IEC technical committee 8: System aspects of electrical energy supply. It is a Technical Specification.

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

Draft	Report on voting
8/1588/DTS	8/1602/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/standardsdev/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.

IMPORTANT – The "colour inside" logo on the cover page of this document 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

With the development of smart grid and massive deployment of renewable energy, power quality issues have received attention not only from system operators and customers (especially with sensitive power quality loads) but also from market regulators with the demands to provide information on the actual power quality level. Power quality management of the grid is a systematic project which includes the whole process of planning, operation, assessment and mitigation. The characteristics of power supplier, load characteristics of power consumer and external environment will affect the power quality of the grid. This document focuses on the whole process management and is the general guideline for this series of standards.

Traditional electrified railways, steel mills and other non-linear loads are the main pollution sources of the power quality. In recent years, the new loads such as new energy and electric vehicles have brought new challenges to power quality management. The rapid popularization and application of high-tech precision technology has also put forward new requirements for high-quality power supply and consumption system.

Power quality is an important issue for electricity supply network operators, which needs to be handled at planning and operation stages. In order to achieve power quality target, reduce power quality impacts/losses and improve the economic efficiency of the system, power quality regulation and supervision of the operating power system is necessary, and a well-considered power quality planning before project implementation is also needed, such as system expansion, construction and grid connection of the distributed generation. Besides, the users at the end of power system should also be taken into consideration. Power quality problems can cause system instability, equipment abnormal operation and supply interruption. Power quality management is a method to avoid further power quality problems after project implementation.

The standard system in power quality management provides a technical basis for improving power management level and standardizing power quality industry and market. As the general guideline of the standard series, this specification summarizes the power quality indicators and assessment methods, and analyzes the overall power quality level by monitoring assessment and predicted assessment. Monitoring system and field test are used to assess the power quality level at different nodes of the grid, and solve users' power quality complaints and other practical problems. Connection and monitoring points are reasonably selected to assess the power quality levels of the grid in operation stage, and it also contributes to the power quality mitigation. In addition, the economical assessment of power quality is regulated in the document. Power quality management use cases in different typical scenarios are shown in Annex A.

POWER QUALITY MANAGEMENT –

Part 1: General guidelines

1 Scope

This part of IEC 63222, which is a Technical Specification, is intended to provide provisions associated to the main use cases regarding recognized engineering practices applicable to power quality management in public electric power supply networks. It summarizes the operation in power quality management and investigates the current standards, for requirement of power quality assessment work, as well as to promote the development of power quality management best practices.

The power quality management domain groups use cases and associated power quality requirements common to network management, including customer support network operation, network and extension planning.

This document captures possible "common and repeated use" of power quality management under the format of "use case". Use case implementations are given for information purpose only. This document derives the common requirement as provisions by further standardization activities, in terms of actors interacting with the given system. The interface requirement is considered for later standardization activities. The relationship of the stakeholders in power quality management, such as network operator, network user, etc., are discussed in the document. Table 1 highlights the domains and business use cases described.