P2938

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1.1 Project Number: P2938
1.2 Type of Document: Guide
1.3 Life Cycle: Full Use

2.1 Project Title: Guide for Economic Loss Evaluation of Sensitive Industrial Customers Caused by Voltage Sags

3.1 Working Group: Economic Evaluation of Voltage Sags(PE/T&D/PQ_EEVSWG)
3.1.1 Contact Information for Working Group Chair:
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None
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4.1 Type of Ballot: Entity
4.2 Expected Date of submission of draft to the IEEE SA for Initial Standards Committee Ballot: Oct 2022
4.3 Projected Completion Date for Submittal to RevCom: Aug 2023

5.1 Approximate number of entities expected to be actively involved in the development of this project: 4
5.2 Scope of proposed standard: This guide provides a method to evaluate the economic loss impact of voltage sags on sensitive industrial customers. It describes how to carry out cost and loss economic-assessment of voltage sags, what economic indexes and assessment flowcharts can be considered, how to efficiently collect useful data for evaluation, and recommended experimental method for testing users' equipment and production line.

5.3 Is the completion of this standard contingent upon the completion of another standard? No
5.4 Purpose: The purpose of this guide is to provide a technique for evaluating economic-losses of sensitive industrial customers caused by voltage sags, and further provides mathematical means, e.g. economic indexes and assessment flowcharts, to quantify the losses of sensitive customers.
5.5 Need for the Project: Voltage sags often lead to an immediate impact on production and need a period of time to recover production, bringing direct economic losses to users, such as semiconductor chip manufacturers. Industrial customers are concerned about the economic-losses caused by voltage sags. Techniques to avoid and reduce the impact of voltage sags are well known and the implementation costs are relatively convenient to determine. But, there is no guide for users to quantitative evaluate the economic-loss caused by voltage sags and to provide decision-making aids for applying countermeasures. There is no uniform method and system for cost-losses assessment.
The evaluation index, system, evaluation method and recommended economic loss test experimental method and user economic cost data collection method involved in this guide can qualitatively and quantitatively determine economic-losses of an industrial user caused by voltage sag. Use of this guide can strengthen a

user’s cost management and guide users to comprehensively consider long-term benefits. It can help users make a rational investment to improve the tolerance of industrial equipment and actively cooperate with power supply companies to take specific measures. Combined with power quality disturbances levels and immunity of end-use equipment, this guide aims to increase understanding of voltage sags and other related power quality standards, e.g. IEEE Std 1564-2014 and IEEE Std 1159.

5.6 Stakeholders for the Standard: Distribution network operators and corporation; Industrial power customers (especially voltage sensitive loads)

6.1 Intellectual Property

6.1.1 Is the Standards Committee aware of any copyright permissions needed for this project? No

6.1.2 Is the Standards Committee aware of possible registration activity related to this project? No

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7.1 Are there other standards or projects with a similar scope? Yes

Explanation: 1☐ Recommended Practice for Evaluating Electric Power System Compatibility with Electronic Process Equipment

In the field of economic evaluation, this document discusses how to determine the cost of a process disruption and how to evaluate payback. But this practice mainly focuses on the compatibility between energy system and sensitive equipment. For the power quality aspects, more flowcharts and indexes are needed to evaluate the economic loss of industrial production caused by voltage sags. Generally speaking, the research content is relatively academic, and there is a certain gap from the actual engineering.

2☐ Economic Framework for Voltage Quality

This report summarizes the related work on the economic evaluation of voltage quality in academic circles, and covers a wide range, and lacks the evaluation index, system and recommended economic loss test method for voltage sag loss. There is a certain distance from industrial standardization. Specifically, the sag loss index is not unified, and the report conclusions are often only for one type of sensitive equipment (such as PLC and ACC). Meanwhile, the test method of the sensitive equipment to the sag is not clear. There are not only test methods based on the Voltage Tolerance Curve (VTC)☐ Process Immunity Time (PIT) test respectively, but also methods that use the probability prediction of typical sensitivity curve. The research results are relatively academic.

3☐ Voltage Sag Immunity of Equipment and Installations

In the term of economic evaluation, factors influencing the assessment of the cost of downtime of industrial processes are discussed, followed by a detailed methodology for making sound economic decisions regarding the investment in mitigating solutions are also presented. The shortcomings of this report are similar to those in C4.107, which is that the report lacks evaluation indexes, and system and recommended economic loss test method for voltage sag loss.

7.1.1 Standards Committee Organization: IEEE
Project/Standard Number: IEEE std 1346-1998
Project/Standard Date: 01 Jan 1998
Project/Standard Title: IEEE Recommended Practice for Evaluating Electric Power System Compatibility with Electronic Process Equipment

7.1.2 Standards Committee Organization: CIGRE
Project/Standard Number: JWG C4.107
Project/Standard Date: 18 Nov 2009
Project/Standard Title: Economic Framework for Voltage Quality

7.2 Is it the intent to develop this document jointly with another organization? No

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8.1 Additional Explanatory Notes : This guide also aims to help further understand voltage sags and other related power quality standards, for instance

(1) IEEE Std 1564-2014 IEEE guide for Voltage Sag Indices

(2) IEEE Std 1159-2009 IEEE Recommended Practice for Monitoring Electric Power Quality