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IEEE Guide for Identifying and Improving Voltage Quality in Power Systems

IEEE Power and Energy Society

Sponsored by the
Transmission and Distribution Committee

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USA

IEEE Std 1250™-2018
(Revision of IEEE Std 1250-2011)

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Approved 27 September 2018

IEEE-SA Standards Board

Abstract: The use of some electrical equipment attached to typical power systems creates power quality concerns. There is an increasing awareness that some equipment is not designed to withstand the surges, faults, distortion, and reclosing duty present on typical utility distribution systems. Traditional concerns about steady-state voltage levels and light flicker due to voltage fluctuation also remain. These concerns are addressed by this guide by documenting typical levels of these aspects of power quality and indicating how to improve them. Other documents that treat these subjects in more detail are referenced.

Keywords: benchmarking, dips, disturbance analyzers, faults, harmonic distortion, IEEE 1250, light flicker, momentary voltage disturbances, noise, performance, power conditioners, power quality, sags, susceptible equipment, surge protection, surges, swells, transients, voltage fluctuation, voltage quality

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The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA

PDF: ISBN 978-1-5044-5203-8 STD23330
Print: ISBN 978-1-5044-5204-5 STDPD23330

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IEEE Guide for Identifying and Improving Voltage Quality in Power Systems

1. Overview

1.1 Scope

The reader of this guide will find discussions of ways to identify and improve power quality in power systems, as well as references to publications in this area. More specifically, this guide includes the following:

a) Power quality levels from benchmarking studies

b) Factors that affect power system performance

c) Mitigation measures that improve power system performance

d) References to current relevant in-depth IEEE standards and other documents

This guide only addresses subjects in depth where no other power quality reference does so. It is a "gateway" document for power quality that points the way to other documents in this field.

1.2 Purpose

The primary purpose of this guide is to assist power delivery system designers and operators in delivering power with power quality that is compatible with electrical end-use equipment. Another purpose is to point utility system customers toward power quality solutions that may exist in the power utilization system and equipment.

2. The power system

2.1 Introduction

This subclause describes typical utility power systems. Understanding the basics of power system design and operation is helpful in understanding the power quality characteristics described in Clause 3. Power quality characteristics can be affected at various levels of a power system. Electricity is typically generated and delivered at either 50 Hz or 60 Hz.