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IEEE Guide for the Application and Specification of Harmonic Filters

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IEEE Power and Energy Society

Developed by the
Transmission and Distribution Committee

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(Revision of IEEE Std 1531-2003)

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IEEE Guide for the Application and Specification of Harmonic Filters

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Transmission and Distribution Committee
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Abstract: Guidelines for the specification of components, protection, and control of harmonic filters are provided in this guide. The guide applies to the use of 50 Hz and 60 Hz passive shunt power harmonic filters on low-voltage, medium-voltage, and high-voltage electric power systems. This document is specifically created for harmonic filters, although standards do exist for most of the components that are used in a filter. Applications including industrial low-voltage facilities, utility medium-voltage systems, and arc furnace installations are covered.

Keywords: capacitors, harmonic filters, IEEE 1531™, inductors, notch filters, passive filters, power filters, power system harmonics, reactors, switched capacitor filters

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Introduction

This introduction is not part of IEEE Std 1531-2020, IEEE Guide for the Application and Specification of Harmonic Filters.

This guide addresses the specification of the components, protection, and control of harmonic filters. It does not address the proper sizing or configuration of harmonic filters to achieve desired performance. This document provides guidelines for passive shunt harmonic filters for use on 50 Hz and 60 Hz power systems to reduce harmonic distortions and/or to provide capacitive reactive power for load or system compensation. As of publication of this guide, no IEEE standards exist specifically for harmonic filters, although IEEE standards do exist for most of the components that are used in a filter.

This revision provides clarification and corrections to the text published in 2003, for example, clarifying the current rating of filter tuning inductors to be consistent with the National Electrical Code® (NEC®) (NFPA 70®) and its current rating of conductors in a capacitor circuit.[1] A harmonic filter may also be referred to as a detuned or tuned capacitor bank where the objective is to provide reactive power compensation, with the additional requirement that the design must also avoid excessive amplification of harmonics from the loads or existing power system background harmonics.

[1] Information on normative references can be found in Clause 2.

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IEEE Guide for the Application and Specification of Harmonic Filters

1. Overview

1.1 Scope

This guide addresses the selection of the components, protection, and control of harmonic filters. It does not address the engineering required to establish the proper size and configuration of harmonic filters to achieve desired performance. This document provides guidelines for passive shunt harmonic filters for use on 50 Hz and 60 Hz power systems to reduce harmonic distortion on the system(s). (As of publication of this guide, no IEEE standards exist specifically for harmonic filters, although IEEE standards do exist for most of the components that are used in a filter. This guide references standards where they exist and gives typical criteria where appropriate standards do not exist.)

1.2 Word usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals is *required to*).[2,3]

The word *should* indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required (*should* equals is *recommended that*).

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals is *permitted to*).

The word *can* is used for statements of possibility and capability, whether material, physical, or causal (*can* equals is *able to*).

[2] The use of the word *must* is deprecated and cannot be used when stating mandatory requirements; *must* is used only to describe unavoidable situations.
[3] The use of *will* is deprecated and cannot be used when stating mandatory requirements; *will* is used only in statements of fact.