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IEEE Guide for Specification of Transmission Static Synchronous Compensator (STATCOM) Systems

IEEE Power and Energy Society

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IEEE Guide for Specification of Transmission Static Synchronous Compensator (STATCOM) Systems

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Abstract: Assisting users in specifying the functional requirements for transmission static synchronous compensator (STATCOM) systems using forced commutated technology based on voltage sourced converter topologies is the purpose of this guide. These systems may be hybrid, and also incorporate thyristor and mechanically switched inductors and capacitors. Reactive power compensation, voltage regulation and control, transient and dynamic stability, and control and protection are the functions included. Accepted engineering practices for the application of STATCOM systems are presented. Specifications, typical application requirements, engineering studies, main component characteristics, system functions and features, factory testing, commissioning, and operations are covered. Informative annexes that allow users to develop or modify specific clauses to meet the requirements of a particular transmission system application are included.

Keywords: functional requirements, high voltage power transmission systems, IEEE 1052™, power system compensation, reactive power supply, static synchronous compensator (STATCOM), static var compensator (SVC), transient and dynamic stability, voltage regulation

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Introduction

This introduction is not part of IEEE Std 1052™-2018, IEEE Guide for Specification of Transmission Static Synchronous Compensator (STATCOM) Systems.

This document is a new guide, based on the revised version of IEEE Std 1031™-2011, Guide for the Functional Specification of Transmission Static Var Compensators. The guide provides an example and general information that may be considered when developing a technical specification for a transmission static synchronous compensator (STATCOM) specification.

This guide is not a tutorial, and application of its contents in preparing a technical specification should be done with sufficient technical knowledge and understanding. This guide may not include all topics necessary for every STATCOM application and does not address any commercial conditions applicable to specific projects.

This guide was prepared by a task force of Working Group I5, Voltage Sourced Converters in Substations, of the High Voltage Power Electronic Stations Subcommittee for the IEEE PES Substations Committee.

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IEEE Guide for Specification of Transmission Static Synchronous Compensator (STATCOM) Systems

1. Overview

1.1 Scope

This guide assists users in specifying the functional requirements for transmission static synchronous compensator (STATCOM) systems using forced commutated technology based on voltage sourced converter topologies. This guide covers specifications, applications, engineering studies, main component characteristics, system functions and features, factory testing, commissioning, and operations of the STATCOM systems. A number of sections in the guide can be used for active filters and for industrial or distribution system applications. However, reactive power compensation, mitigation of load disturbances, or phase unbalance compensation for industrial and distribution system applications are not included in this guide. Commercial terms and conditions for the purchase of the STATCOM systems are also beyond the scope of this document.

General terms and conditions forming the commercial part of a specification for a particular project are outside the scope of this document.

1.2 Purpose

This guide presents technical information that may be used as the basis of functional specifications for STATCOM systems for transmission systems. For transmission systems, functions covered include reactive power compensation, voltage regulation and control, transient and dynamic stability, main components, control and protection, and accepted engineering practices for the application of STATCOM systems applications. This guide also includes informative appendices that allow users to develop or modify specific clauses to meet a particular system application. The wording deliberately uses “should” rather than “shall”, given that the document is a guide, not a standard specification. The user of this guide might wish to make this adjustment when converting specific sections into a specification. The guide includes the following:

— Newer developments in STATCOM components, particularly control systems

— Information on latest practices for STATCOM applications

— An informative annex to allow users to modify or develop specific clauses to meet a particular system application