IEEE Guide for Power System Protection Testing

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Abstract: Test approaches and procedures for the components and the overall protection and control system functions are presented. Test of equipment in the system protection scheme, associated communications equipment, auxiliary power supplies, and the control of power apparatus are addressed. Much of the testing emphasizes a bottom-up approach, in which the basic behavior of scheme components are verified first, followed by testing of interconnected components in a function-oriented assembly.

Keywords: application testing, commissioning testing, design testing, maintenance testing, performance assessment

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Introduction

This introduction is not part of IEEE Std C37.233-2009, IEEE Guide for Power System Protection Testing.

This guide focuses on the general approach and specific procedures for testing protective relaying systems that include multiple interacting relay components, auxiliary devices, and power apparatus. In the most critical applications, these system devices may interact over an extended physical or geographic area and use communications systems. The procedures focus separately on design testing, commissioning testing, routine maintenance testing, and ongoing performance assessment with a discussion of what each of these test categories aims to accomplish.

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IEEE Guide for Power System Protection Testing

1. Overview

1.1 Scope

This guide covers suggested test requirements for power system protection scheme testing, system application tests, the scope and level of tests based on the application, and benefits of the overall protective schemes testing. This guide encompasses overall system testing procedures (generators, line, line reactors, transformer, capacitors, special protection schemes, end-to-end testing, distributed application within substation, etc.) and data collection requirements, as well as the test procedure definitions. This guide describes the methods, extent, and types of system tests for protection applications at various voltage levels. Control functions inherent to the protective systems are included. Importance of line testing, indirect trip applications, open/closed-loop tests, and dynamic/nonlinear tests are also covered.

1.2 Purpose

This guide is intended for power system protection professionals. It includes a reference list of type tests for protective devices as well as overall protection scheme performance tests for various types of protection schemes. The guide describes the methods, extent, and types of protection scheme tests. Interlocking and control functions inherent to the protective schemes are included.