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IEEE Guide for Application and User Guide for Gas-Insulated Transmission Lines, Rated 72.5 kV and Above

IEEE Power and Energy Society

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Abstract: Guidance for the planning, permitting, design, equipment specification, installation, commissioning, operation, and maintenance of gas-insulated transmission lines is provided in this project. Only technical aspects are addressed in this guide. Commercial and legal issues associated with gas-insulated transmission lines are not considered. This guide applies to ac transmission lines rated for maximum operating voltage of 72.5 kV and higher.

Keywords: gas-insulated bus, gas-insulated cable, gas-insulated line, gas-insulated substation, gas-insulated switchgear, gas-insulated transmission line, GIB, GIC, GIL, GIS, IEEE C37.122.4™

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Introduction

This introduction is not part of IEEE Std C37.122.4™-2016, IEEE Guide for Application and User Guide for Gas-Insulated Transmission Lines, Rated 72.5 kV and Above.

Gas-insulated line (GIL) has been manufactured starting in the early 1970s when the first gas-insulated substations were introduced. IEEE has not had any standard to address any manufacturing of GIL. To address IEEE policy that IEEE standards should be harmonized with international standards whenever possible, a study was conducted by a joint task force of the Substations Committee and the International Electrotechnical Commission (IEC). This included creating an IEEE Standard that generally aligned with the IEC GIL standards.

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IEEE Guide for Application and User Guide for Gas-Insulated Transmission Lines, Rated 72.5 kV and Above

1. Overview

The purpose of this guide is to provide technical assistance for the selection, application, and project management for a gas-insulated line (GIL) transmission project from initial planning through decommissioning and retirement. It is not within the scope of this guide to address contractual or commercial questions related to GIL projects.

The document includes tables, flowcharts, and other aids that may be of use in a typical GIL project. While not required, a certain minimum knowledge of GIL is advantageous in order to utilize the benefits of this technology. The relevant information for accurate system planning using GIL is also included in this document, along with operations and maintenance information.

This guide includes equipment with the following specifications or characteristics: rated voltage 72.5 kV and above, alternating current, single-phase, rigid (solid aluminum) enclosure, installed above ground, in a trench, directly buried or in tunnel, laid horizontally, vertically, at any angle, and using pure SF_6 or a mixture of SF_6 with nitrogen as the insulating medium.

1.1 Scope

This project will provide guidance for the planning, permitting, design, equipment specification, installation, commissioning, operation, and maintenance of gas-insulated transmission lines. The guide will address technical aspects only. Commercial and legal issues associated with gas-insulated transmission lines are not considered. This guide applies to ac transmission lines rated for maximum operating voltage of 72.5 kV and higher.

1.2 Purpose

There is currently no complete guide covering planning, design, installation, and operation of gas-insulated transmission lines. The guide produced by this project will fill this void and become a useful reference for electric power engineers considering the installation of GIL.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is