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IEEE Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances

IEEE Power and Energy Society

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Transformers Committee

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IEEE Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances

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Transformers Committee
of the
IEEE Power and Energy Society

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Abstract: The effects of geomagnetic disturbances (GMD) on power transformers when there is the presence of geomagnetically induced current (GIC) in a power transformer are described. Specification parameters and performance characteristics for power transformers to help minimize the risk and impact when GIC is present in the power system are established. The intent is to provide a background that can help evaluate the effect of GIC on a power transformer design and its GIC capability. This includes the evaluation techniques to determine the performance characteristics while under the influence of GIC.

Keywords: core saturation, design review, geomagnetically induced current (GIC), geomagnetically induced current signature, geomagnetic disturbances (GMD), IEEE C57.163, magnetic, monitoring, temperature gradient, testing, thermal, power transformers

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Introduction

This introduction is not part of IEEE Std C57.163-2015, IEEE Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances.

This guide has been developed to address the global impact of geomagnetic disturbances (GMD) on the reliable operation of bulk electric system (BES) including power transformers. The Standards Subcommittee of the IEEE Power and Energy Society Transformers Committee responded by assembling a working group to develop this guide. The intent of this guide is to provide a common framework for considering the capability of power transformers while under the impact of geomagnetic disturbances. This IEEE Transformer Committee guide is the first industry document of its type and facilitates the evaluation and understanding of performance of transformers under GMD conditions.

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IEEE Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances

1. Overview

1.1 Scope

This guide describes the effects of geomagnetic disturbances (GMD) on power transformers when there is the presence of geomagnetically induced current (GIC) in a power transformer. It establishes specification parameters and performance characteristics for power transformers to help minimize the risk and impact when GIC is present in the power system. The intent is to provide a background that can help evaluate the effect of GIC on a power transformer design and its GIC capability. This includes the evaluation techniques to determine the performance characteristics while under the influence of GIC.

It does not include the effect of GIC on other power system devices beyond power transformers and accessories. It does not discuss mitigation techniques and mitigation devices such as neutral-blocking devices on equipment beyond power transformers and accessories.