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IEEE Guide for the Use of Dissolved Gas Analysis Applied to Factory Temperature Rise Tests for the Evaluation of Mineral Oil-Immersed Transformers and Reactors

IEEE Power and Energy Society

Sponsored by the
Transformers Committee

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IEEE Guide for the Use of Dissolved Gas Analysis Applied to Factory Temperature Rise Tests for the Evaluation of Mineral Oil-Immersed Transformers and Reactors

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Abstract: Application of dissolved gas analysis (DGA) techniques on oil-immersed transformers and reactors applied during factory temperature rise tests is addressed in this guide. It contains recommended procedures for sampling, recommended actions based on interpretation of results, and a bibliography of related literature.

Keywords: dissolved gas analysis, IEEE C57.130™, factory temperature rise tests

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Introduction

This introduction is not part of IEEE Std C57.130™-2015, IEEE Guide for the Use of Dissolved Gas Analysis Applied to Factory Temperature Rise Tests for the Evaluation of Mineral Oil-Immersed Transformers and Reactors.

The evaluation of gases generated in oil-immersed transformers and reactors during factory temperature rise tests is a useful method of detecting thermal problems. These thermal problems may be due to abnormal leakage flux heating in the windings and leads, the magnetic circuit, or in structural elements. They may also be caused by inadequate heat dissipation or poor oil circulation within the core or windings, imperfect connections or contacts, excessive paper insulation, or clogged or inadequate cooling ducts.

This guide was written with the understanding that, as additional experience is gained; periodic reviews will be made to ensure that recommendations in this guide continue to be based on the most up-to-date information. The factory temperature rise test (formerly known as the heat run test) is performed in accordance with IEEE Std C57.12.90™ to determine whether the temperature rises of the windings, oil and other components meet design values. When testing power transformers, it is normally performed by the short circuit method; therefore, the losses and corresponding heating produced by core flux are minimal and the superposition of core and leakage flux during actual loading are not accurately represented by this test. On the other hand, during much of this test, a transformer is operated at higher-than-rated current to simulate core losses. During factory temperature rise tests, only the more serious design or manufacturing defects become apparent and less severe conditions, which could lead to future problems in service can escape detection.

This document is, in general, an advisory document that provides guidance on the subject of DGA as it applies to the factory temperature rise test. The ultimate decision on the evaluation of acceptable levels of gas generated during the temperature rise test should be made by the user and manufacturer at the time of contract negotiation. This could include for instance reports of the factory DGA test data to be provided to the user upon request.

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1. Overview

1.1 Scope

This document provides guidance in the application of dissolved gas analysis (DGA) to transformers and reactors subjected to factory temperature rise tests. This document consists of evaluation procedures and guidelines for acceptable levels of gases generated in conventional mineral oil-filled transformers and reactors during factory temperature rise tests.

1.2 Purpose

The Purpose of this Guide is to provide guidance in the application of dissolved gas analysis (DGA) to transformers and reactors subjected to factory temperature rise tests. This document consists of evaluation procedures and guidelines for acceptable levels of gases generated in conventional mineral-oil-filled transformers and reactors during factory temperature rise tests.