

IEEE Guide for Moisture Measurement and Control in SF₆ Gas-Insulated Equipment

IEEE Power and Energy Society

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Abstract: Guidelines for moisture level measurement, moisture data interpretation, and moisture control in gas-insulated switchgear (GIS) are provided.

Keywords: circuit breakers, gas-insulated substation, gas-insulated switchgear, GIS, GIS design, GIS equipment, GIS installation, GIS testing, IEEE 1125™, IEEE C37.122.5™, moisture measurement, SF₆, SF₆ analysis, SF₆ handling, sulfur hexafluoride

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Introduction

This introduction is not part of IEEE Std C37.122.5™-2013, IEEE Guide for Moisture Measurement and Control in SF6 Gas-Insulated Equipment.

The objectives of this guide are to introduce the importance of moisture and control in the design, manufacture, installation, operation and maintenance of transmission class gas-insulated switchgear and to provide guidance for measurements of moisture in gas-insulated switchgear.

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1. Overview

1.1 General

Moisture measurement (in the form of humidity) and control constitute a major part of an effective commissioning and maintenance program for gas-insulated substations (GIS) and other SF₆ gas-insulated equipment (GIE). Note that the term GIS is used throughout this guide as a simplified term, but is also meant to include other types of GIE as applicable. There are two separate and distinct issues relating to moisture within GIS:

- a) Very high levels of humidity increase the possibility that water molecules will condense into the liquid phase, adversely affecting the dielectric withstand strength of GIS [B14]¹ and significantly increasing the possibility of flashover. Therefore, humidity in GIS should be maintained at a level such that the humidity does not condense in the form of liquid water over the entire range of the expected operating temperatures and gas pressures.
- b) The formation of corrosive and toxic decomposition by-products occurs in reactions between moisture and dissociated SF₆ found in the high energy arcs during normal switching operations. Higher concentrations of humidity can result in higher concentrations of decomposition by-products [B3]. These by-products cause corrosion and may degrade insulators and other internal components within the GIS, and pose a safety hazard.

¹ The numbers in brackets correspond with those in Annex B.