

IEEE Standard for Performance Characteristics and Dimensions for High Current Power Transformer Bushings with Rated Continuous Current in Excess of 5000 A in Bus Enclosures

IEEE Power and Energy Society

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Transformers Committee

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Abstract: The electrical, dimensional, and related special requirements for high current rating power transformer bushings within bus enclosures that have rated continuous current in excess of 5000 A are addressed in this standard. Bushings covered by this standard are intended for use as components of liquid-filled transformers, including but not limited to Generator Step-Up (GSU) Transformers.

Keywords: basic impulse insulation levels (BILs), bushings, cantilever test, capacitance, creepage distance, generator step-up (GSU) transformers, isolated-phase bus, line-to-ground voltage, metal-enclosed bus, nominal system voltage, power transformer bushings, power factor

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Introduction

This introduction is not part of IEEE Std C57.19.04-2018, Standard for Performance Characteristics and Dimensions for High Current Power Transformer Bushings with Rated Continuous Current in Excess of 5000 A Located in Bus Enclosures.

IEEE Std C57.19.00™ and IEEE Std C57.19.01™ define the dimensions and performance characteristics of outdoor apparatus bushings, which are intended for use in an environment where the upper end of the bushing is subject to ambient, free air. Such bushings may not have a satisfactory life expectancy if the upper end is in a metal enclosure and the upper terminal is connected to bus designed to perform as described in IEEE Std C37.23™.

In the power generation industry, bushings located on the low voltage side of generator step-up transformers are commonly subject to an environment that is hotter than the usual service conditions defined in IEEE Std C57.19.00. For such an application, bushings can be directly connected to metal-enclosed bus, which allows a temperature rise much higher than the temperature rise described in IEEE Std C57.19.00 temperature rise design test, and are continuously loaded to levels which subject the bushings to more than 5000 A. This new standard, IEEE Std C57.19.04™, has been created because low-voltage bushings of generator step-up transformers have remained dimensionally undefined with undocumented performance expectations for a very long time.

Misapplying bushings that comply with the performance requirements of IEEE Std C57.19.00 and IEEE Std C57.19.01 in an environment typical of how the low voltage bushings of a generator step-up transformer would reside often leads to overheating, insulation breakdown, overpressure, gasket damage, rapid breakdown of insulation, and premature end-of-life.

Users which specify their high current bushings residing in metal enclosed bus duct (i.e., isophase or non-segmented bus duct, air terminal chamber), should adhere to IEEE Std C57.19.04 to improve long-term and robust performance, as well as mechanical interchangeability over the life of their asset.

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