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IEEE Standard for Common Requirements for Testing of AC Capacitive Current Switching Devices over 1000 V

IEEE Power and Energy Society

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IEEE Std C37.100.2™-2018

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Abstract: Common requirements for testing of AC capacitive current switching devices with nominal system voltage above 1000 V are provided in this standard.

Keywords: back-to-back switching, bank charging, C0, C1, C2, cable charging, capacitive current switching, capacitor switching, design test, IEEE C37.100.2™, line charging, preconditioning, restrike, single-phase testing, synthetic test, three-phase testing, unit test

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Introduction

This introduction is not part of IEEE Std C37.100.2-2018, IEEE Standard for Common Requirements for Testing of AC Capacitive Current Switching Devices over 1000 V.

The scope of this document is limited to testing switching devices for capacitive current switching capability only. For other testing requirements, refer to the relevant apparatus standards.

This capacitive current switching test standard is a document combining the requirements of IEEE Std C37.09a™-2005 [B7] with IEEE Std C37.66™-2005 [B11] and IEEE Std 1247™-2005 [B3]. IEEE Std C37.09a-2005 was selected as the base document because it had been harmonized by a joint IEEE/IEC task force that developed a revised approach to capacitive current switching standardization. IEC has published this task force's work as part of IEC's circuit breaker standard, designated IEC 62271-100. Please note that since IEEE Std C37.016™-2006 [B9] refers to IEEE Std 1247-2005 [B3] for all of the capacitive current switching tests it specifies, consideration of IEEE Std 1247-2005 [B3] covers the requirements of IEEE Std C37.016-2006 [B9].

The term circuit-breaker from IEEE Std C37.09a [B7] has been replaced with the term capacitive current switching device for this document.

These standards represent two basic methods for determining capacitive current switching performance. The method to prove performance per IEEE Std C37.09a [B7] is based on focusing on the performance at minimum arcing time and then demonstrating the rest of the interrupting window. IEEE Std C37.66 [B11] and IEEE Std 1247 [B3] are testing performance and endurance through a large number of test operations up to 1200 operations. To reconcile the different methods a subclause, 4.9, was added to this standard allowing the 1200 random operation method to be used to achieve a capacitive current switching rating. For example, a C2 rating can be achieved either by 1200 single-phase operations with a maximum of two restrikes as specified in IEEE Std C37.66 [B11] or 168 single-phase operations (targeted to minimum arcing time) with no restrikes as specified in IEEE Std C37.09a [B7].

The three classes of capacitive current switching test restrike performance are retained from IEEE Std C37.09a—very low probability of restrike (Class C2), low probability of restrike (Class C1), and unspecified probability of restrike (Class C0).

IEEE Std C37.09a [B7] is based on an assumption of "simultaneity". IEEE Std 1247-2005 [B3] had a detailed scheme in Table 4. The working group has simplified this table to two values. If the non-simultaneity is between 0 and 90 electrical degrees, then the voltage factor (k_c) is 1.4. If the non-simultaneity is greater than or equal to 90 electrical degrees, then the voltage factor (k_c) is 2.1.

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IEEE Standard for Common Requirements for Testing of AC Capacitive Current Switching Devices over 1000 V

1. Overview

1.1 Scope

This standard provides common requirements for testing of ac capacitive current switching devices over 1000 V.

1.2 Usage of terms

Each of the various U.S. and international standards use different terminology for operating a switch. For this standard, the following terminology is used. “Making” applies to closing the contacts with voltage applied and “breaking” applies to operations that interrupt current. The term “switching” refers to the act of making then breaking. The terms “opening” and “closing” refer to the mechanical action (i.e., without current in the main current path or voltage present). Many existing standards and definitions use opening and closing to describe actions both with and without current flow and rely upon the context of the usage to inform the reader whether or not current is made or interrupted. When referring to other documents and definitions the contextual nature of these works should be understood; it is not the purpose of this document to change the meaning of these other documents. For example, the *IEEE Standards Dictionary Online* uses the word “opening” rather than “breaking” in the definitions of reignition and restrike. The context, in particular the words “resumption of current” indicates to the reader that “breaking,” as used in this document, is the activity under discussion.

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 explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

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