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C57.19.00™

IEEE Standard General Requirements and Test Procedure for Power Apparatus Bushings

IEEE Power Engineering Society

Sponsored by the
Transformers Committee



3 Park Avenue, New York, NY 10016-5997, USA

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IEEE Power Engineering Society

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IEEE-SA Standards Board

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Abstract: This standard applies to power apparatus bushings that have basic impulse insulation levels of 110 kV and above for use as components of oil-filled transformers and oil-filled reactors.

Keywords: apparatus bushings, bushings, oil-filled reactors, oil-filled transformers

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Introduction

This introduction is not part of IEEE Std C57.19.00-2004, IEEE Standard General Requirements and Test Procedure for Power Apparatus Bushings.

This document is based on the standard practices in the United States for power apparatus bushings. It is the result of joint efforts of professional engineers, manufacturers, and users working together in the Bushing Subcommittee of the IEEE Transformers Committee.

The related IEC standard is IEC-60137 (1995), *Insulated bushings for alternating voltages above 100 V*.

This revision of the standard, which supersedes IEEE Std C57.19.00-1991 (R1995), includes the following significant changes:

- Reorganization and rearrangement to meet the requirements of the IEEE Standards Board Style Manual
- Expansion of the scope to include indoor bushings
- Addition of new definitions
- Redefinition and clarification of the thermal basis of rating
- Addition of short-time current and thermal ratings and associated test requirements
- Revision of existing test requirements and test procedures
- Addition of a special front-of-wave lightning impulse test
- Elimination of bushings for oil filled circuit breakers, which are listed in Annex A of IEEE Std C57.19.01TM-2000.

The original standard, approved in 1942 as AIEE Standard 21 (which became American National Standard for Apparatus Bushings, ANSI C76.1-1943) was prepared by the Joint Committee on Bushing Standardization of the Electric Machinery, Power Transmission and Distribution, and Protection Devices Committees of the American Institute of Electrical Engineers (AIEE) [now the Institute of Electrical and Electronics Engineers (IEEE)] and the National Electrical Manufacturers Association (NEMA). The American National Standards Institute (ANSI) Accredited Standards Committee, C76, was the sponsor of the standard.

A supplement and partial revision, ANSI C76.1a-1958, *Electrical and Dimensional Characteristics of Outdoor Apparatus Bushings (used with Power Circuit Breakers and Outdoor Transformers)*, was prepared by the NEMA Joint Sections Committee on Outdoor Apparatus Bushings (composed of representatives of the High Voltage Insulation Section, Power Circuit Breakers Group, Switchgear Section, and the Transformers Section). It resulted from work by the regional associations of electrical utilities and filled the needs of the user for dimensional interchangeability.

At the time of this supplement, Committee C76 foresaw the need for a general revision and updating of the standard and asked AIEE and NEMA to submit recommendations. In NEMA, implementation of this request was undertaken by a Subcommittee of the Joint Sections Committee on Outdoor Apparatus Bushings and resulted in a proposal, which was approved in February 1960 by the Codes and Standards Committee for submission to Committee C76 as the NEMA recommendation. In the AIEE, a Joint Working Group consisting of members of the Transformer and Dielectric Test Committee, of the Transformers Committee and of the Power Circuit Breaker Committee, was established and developed a recommendation that was submitted to Committee C76 in July 1960. The West Coast Subcommittee of the AIEE Transformers Committee, which developed additional recommendations and submitted them to Committee C76 in November 1960, subsequently reviewed the AIEE proposal. Committee C76 appointed a special Working Group for Revision of ANSI C76.1-1943 to consolidate the several proposals and recommendations. This became IEEE Std 21TM-1964 and was approved June 9, 1964, as ANSI C76.1-1964. It was reaffirmed in 1970.

Work on a revision was initiated in Committee C76 in August 1968. A decision was made to separate the standard into three parts: the first (C76.1) to cover the general requirements and test procedures, the second (C76.2) to cover explicit ratings and dimensions, and the third to be an application guide (IEEE Std C57.19.100™), published in 1995. Other changes in this revision included test procedure updating, adding 362 kV through 800 kV maximum system voltage bushing electrical ratings with wet switching impulse test values and coordination with switching surge sparkover values of arresters and establishing dual current ratings for 115 kV through 196 kV insulation class bushings, since circuit breakers have a lower temperature rise than transformers, permitting a larger current rating for a given maximum ambient temperature when applied to circuit breakers.

The revised standard was approved as IEEE Std 21-1976 on June 3, 1976, and as ANSI C76.1-1976 on July 23, 1976.

Work on the revision approved in 1991 (reaffirmed in 1996) was initiated in the then newly formed Bushing Subcommittee of the Transformers Committee in October 1979. Extensive changes to the standard included a new standard number, IEEE Std C57.19.00™, which is indicative of its new IEEE Sponsor Committee. Other major changes were made to improve the test sequence, to allow apparent charge measurements to be made in addition to radio influence voltage measurements during the low-frequency dry withstand tests, and to provide for special tests, such as thermal stability tests. This standard applies to systems used to communicate between intelligent electronic devices (IEDs) for substation integrated protection, control and data acquisition. The requirements of this standard are in addition to those contained in standards for individual devices (e.g., relays, switchgear).

This standard applies to a rapidly changing technology. It is anticipated that frequent revision may be desirable.

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Current interpretations can be accessed at the following URL: <http://standards.ieee.org/reading/ieee/interp/index.html>.

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