

American National Standard for Switchgear—

Metal-Enclosed Low-Voltage AC Power-Circuit-Breaker Switchgear Assemblies—Conformance Test Procedures

Secretariat

**National Electrical Manufacturers Association
Institute of Electrical and Electronics Engineers**

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American National Standard

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Foreword

(This Foreword is not part of American National Standard C37.51-1989.)

This standard is a revision of American National Standard for Conformance Testing of Metal-Enclosed Low-Voltage AC Power Circuit Breaker Switchgear Assemblies, ANSI C37.51-1979. This revision describes selected tests and procedures to demonstrate conformance in accordance with Section 5, Tests, of American National Standard for Metal-Enclosed Low-Voltage Power Circuit-Breaker Switchgear, ANSI/IEEE C37.20.1-1987. It is being published separately from ANSI/IEEE C37.20-1987 to facilitate its use and to permit timely revisions based on experience.

This standard is one of several in a series of test procedure standards for conformance testing switchgear products. While this standard is written for general guidance, performance criteria are established so that this standard can be adopted as the basis for certification of metal-enclosed low-voltage alternating-current power-circuit-breaker switchgear assemblies for use in nonutility installations subject to regulation by public authorities and similar agencies concerned with laws, ordinances, regulations, administrative orders, and similar instruments.

Suggestions for improvement of this standard will be welcome. They should be sent to the National Electrical Manufacturers Association, 2101 L Street, NW, Washington, DC 20037.

This standard was processed and approved for submittal to ANSI by Accredited Standards Committee on Power Switchgear, C37. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the C37 Committee had the following members:

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Metal-Enclosed Low-Voltage AC Power-Circuit-Breaker Switchgear Assemblies—Conformance Test Procedures

1. Scope

This standard applies to metal-enclosed low-voltage power-circuit-breaker switchgear assemblies and covers the conformance test procedures for the basic switchgear section that includes the structure, circuit-breaker compartments, instrument compartments, buses, and internal connections (see American National Standard for Metal-Enclosed Low-Voltage Power Circuit-Breaker Switchgear, ANSI/IEEE C37.20.1-1987 for assigned ratings and usual service conditions).

This standard does not apply to installations under the exclusive control of electric utilities for the purposes of communication or metering or for the generation, control, transformation, transmission and distribution of electric energy located in buildings used exclusively by utilities for such purposes, or located outdoors on property owned or leased by the utility or on public highways, streets, roads, and the like, or located outdoors by established rights on private property.

Low-voltage switchgear assemblies usually include control and instrumentation components that are unique for the application and are not individually evaluated under this standard. However, these components when utilized in circuits that obtain their energy from primary sources within the low-voltage switchgear shall be suitably protected as specified in 3.2.

NOTE — In this standard, the use of the term “low-voltage switchgear” shall be considered to mean “metal-enclosed low-voltage alternating-current power-circuit-breaker switchgear assemblies.” The use of the term “circuit breaker” shall be considered to mean “low-voltage alternating-current power circuit breaker,” unless qualified by other descriptive terms.

This standard specifies the tests that shall be performed to demonstrate that the low-voltage switchgear being tested conforms with the ratings assigned to it in accordance with American National Standard for Metal-Enclosed Low-Voltage Power Circuit-Breaker Switchgear, ANSI/IEEE C37.20.1-1987, and American National Standard for Switchgear — Low-Voltage Power Circuit Breakers and AC Power Circuit Protectors — Preferred Ratings, Related Requirements, and Application Recommendations, ANSI C37.16-1988.

2. Referenced American National Standards

This standard is intended to be used in conjunction with the following publications. When the referenced standards are superseded by a revision approved by the American National Standards Institute, Inc, the revision shall apply.

ANSI C37.16-1988, Switchgear — Low-Voltage Power Circuit Breakers and AC Power Circuit Protectors — Preferred Ratings, Related Requirements, and Application Recommendations

ANSI C37.50-1989, Switchgear — Low-Voltage AC Power Circuit Breakers Used in Enclosures — Test Procedures

ANSI/IEEE C37.09-1979 (R 1989), C37.09c-1984, and C37.09e-1985, Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis

ANSI/IEEE C37.13-1981, Low-Voltage AC Power Circuit Breakers Used in Enclosures

ANSI/IEEE C37.20.1-1987, Metal-Enclosed Low-Voltage Power Circuit-Breaker Switchgear

ANSI/IEEE C37.26-1972 (R 1978), Guide for Methods of Power-Factor Measurement for Low-Voltage Inductive Test Circuits¹

ANSI/IEEE 4-1978, Standard Techniques for High Voltage Testing

3. General Test Conditions

3.1 Ambient Conditions

The conditions prevailing at the test site during tests on low-voltage switchgear shall be those usual service conditions given in Section 3 of ANSI/IEEE C37.20.1-1987, except that the temperature of the air surrounding the assembly (ambient) for the continuous current test shall be within the range of 10° C to 40° C.

3.2 Protection and Conditions — Control and Instrumentation

3.2.1 General

All voltage circuits used for control, relaying, or metering shall be protected within the low-voltage switchgear as follows:

- 1) All circuits supplied from external sources (alternating current or direct current) shall have short-circuit protection within the control source incoming section. This may be provided by a single set of short-circuit protective devices.
- 2) All circuits supplied from internal sources (alternating current or direct current) shall have short-circuit protection within the same section as the supply source. If these circuits are supplied by a control power transformer, this protection may be in the primary circuit only.

Overcurrent protection of voltage circuits may be provided in addition to the required short-circuit protection.

Other circuits supplying loads such as heaters, lights, or receptacles, shall have overload and short-circuit protection.

¹ANSI/IEEE C37.26-1972 has been withdrawn as an American National Standard (pending review or reaffirmation), but is reproduced in the Appendix to aid in the completion of the requirements of ANSI C37.51-1989.

Current transformers shall be of the proper voltage class. Overcurrent protection is not permitted in current transformer secondary circuits.

Voltage transformers or control power transformers are required whenever the nominal primary voltage is greater than 240 volts alternating current.

3.2.2 Control Power Transformers

Short-circuit protection of control power transformers shall be provided in accordance with Table 1.

Table 1— Control Power Transformer Short-Circuit Protection

Single-Phase kVA Rating	Primary Maximum Current-Limiting Fuse Rating — Amperes		
	240 V	480 V	600 V
Up to 1 kVA	10*	10	6
2	20	10	10
3	30	15	15
5	50	25	20
7.5	80	40	30
10	100	50	40
15	150	80	60

*Due to inrush currents, certain types of current-limiting fuses may require larger ratings than those shown, but the ratings shall not exceed 20 amperes.

3.2.3 Voltage Transformers

Voltage transformers shall be protected in the primary circuit with current-limiting fuses not larger than 10 amperes.

4. Conformance Test Requirements

4.1 General

Tests shall be made on representative test arrangements of low-voltage switchgear, as described in 4.3, to demonstrate the capability of the low-voltage switchgear to meet its assigned ratings and to operate under usual service conditions, as outlined in Section 3 of ANSI/IEEE C37.20.1-1987.

For each frame size of the circuit-breaker compartment to be tested, the test arrangement designated in 4.3 shall be used.

4.2 Test Requirements

All test arrangements shall be subjected to the following tests (in accordance with the subsections indicated in parentheses) to prove the adequacy of the design: