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metal-enclosed low-voltage
power circuit-breaker switchgear



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An American National Standard
**IEEE Standard for
Metal-Enclosed Low-Voltage
Power Circuit-Breaker Switchgear**

Sponsor

**Switchgear Committee of the
IEEE Power Engineering Society**

Secretariat

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

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Foreword

(This Foreword is not a part of ANSI/IEEE C37.20.1-1987, IEEE Standard for Metal-Enclosed Low-Voltage Power Circuit-Breaker Switchgear.)

This standard includes only the requirements for metal-enclosed low-voltage power circuit-breaker switchgear. These requirements were previously a part of ANSI/IEEE C37.20-1969 (R 1981), IEEE Standard for Switchgear Assemblies Including Metal-Enclosed Bus (1974 Consolidated Edition). Other types of equipment previously included in ANSI/IEEE C37.20-1969 (R 1981), will now be incorporated in separate publications.

ANSI/IEEE C37.20 has for many years covered all switchgear assemblies including metal-enclosed bus. Standards committees of IEEE Switchgear Assemblies Subcommittee and NEMA Power Switchgear Assemblies Technical Committee recommended that the document be further developed and, where appropriate, the various sections be identified with their own standards. This approach also identifies with the Conformance Test Procedure Standards.

This edition was prepared by the Power Switchgear Assemblies Technical Committee, National Electrical Manufacturers Association (NEMA). NEMA is responsible for Section 4, Ratings and Section 6, Construction.

The Switchgear Assemblies Subcommittee of the IEEE Switchgear Committee is responsible for Section 2, Definitions, Section 3, Service Conditions; Section 5, Tests; Section 7, General Application Conditions; and Section 8, Handling, Storage, and Installation.

A working group of the NEMA Power Switchgear Assemblies Technical Committee revised ANSI/IEEE C37.23-1970, IEEE Guide for Calculating Losses in Isolated-Phase Bus, to include Section 8 of ANSI/IEEE C37.20, Metal-Enclosed Bus. The document updates the material for metal-enclosed conductors including cable bus. The IEEE Switchgear Assemblies Subcommittee refined and expanded the document.

The following documents were developed for each product type based on ANSI/IEEE C37.20 (see Fig A).

- C37.20.1 Metal-Enclosed Low-Voltage Power Circuit-Breaker Switchgear (1000 V and Below)
- C37.20.2 Metal-Clad and Station-Type Cubicle Switchgear (Above 1000 V)
- C37.20.3 Metal-Enclosed Interrupter Switchgear (Above 1000 V)
- C37.21 Control Switchboards
- C37.23 Metal-Enclosed Bus and Guide for Calculating Losses in Isolated Phase Bus

Through this joint effort over the many years, the switchgear assemblies standards have been of extreme value to the industry and further suggestions for improvement gained in the use of this standard will be welcomed.

The Standards Committee on Power Switchgear, C37, which reviewed and approved this standard had the following personnel at the time of approval:

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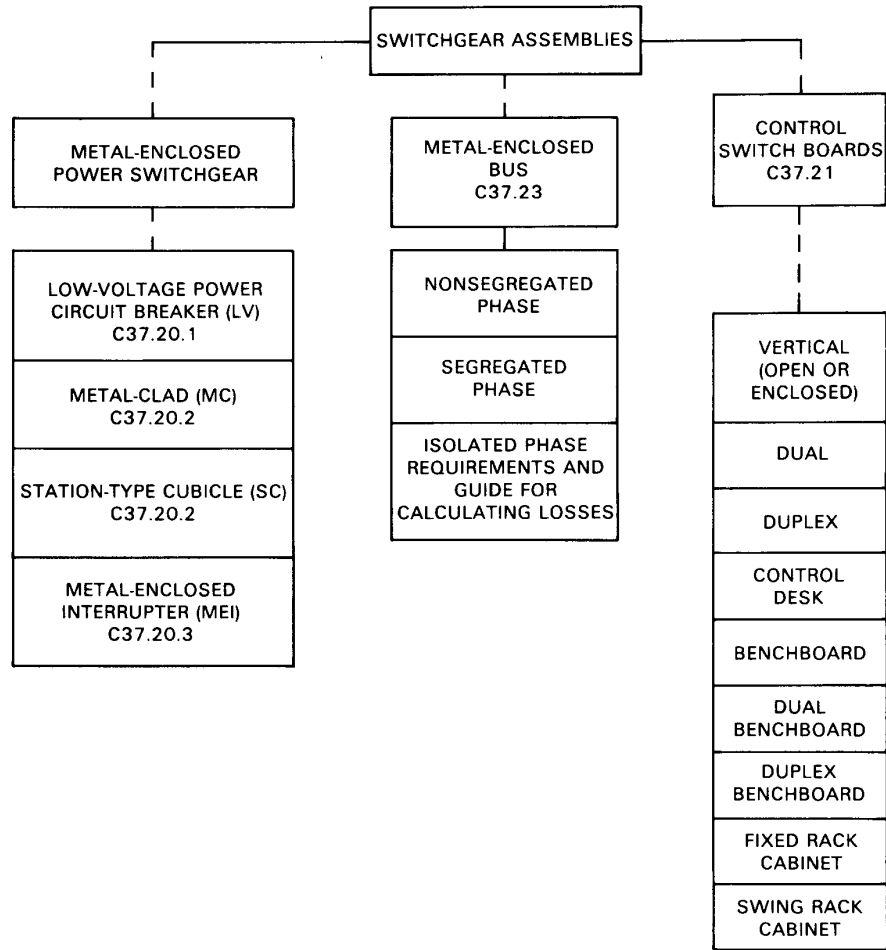


Fig A
Types of Switchgear Assemblies

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IEEE Standard for Metal-Enclosed Low-Voltage Power Circuit-Breaker Switchgear

1. Scope and References

1.1 Scope. This standard covers metal-enclosed low-voltage power circuit-breaker switchgear assemblies containing but not limited to such devices as low-voltage power circuit breakers (fused or unfused), other interrupting devices, switches, control, instrumentation and metering, protective, and regulating equipment.

This standard is concerned with enclosed, rather than open, switchgear assemblies. It includes equipments that are part of secondary unit substations. It does not apply to equipment covered by industrial control standards, communication switchboards, communication switching equipment, switchboards for use on board ships, or deadfront distribution switchboards.

In this standard, metal-enclosed low-voltage power circuit-breaker switchgear shall be called LV switchgear. For ac LV switchgear the voltage shall be 1000 V or below and for dc LV switchgear, the voltage shall be 3200 V or below.

1.2 References

- [1] ANSI C2-1987, American National Standard National Electrical Safety Code.¹
- [2] ANSI C37.16-1980, American National Standard Related Requirements and Application Recommendations for Low-Voltage Power Circuit Breakers and AC Power Circuit Protectors, Preferred Ratings.²

¹ This publication is available from the Sales Department, American National Standards Institute, 1430 Broadway, New York, NY 10018 or from the IEEE Service Center, 445 Hoes Lane, PO Box 1331, Piscataway, NJ 08855-1331.

² ANSI publications are available from the Sales Department, American National Standards Institute, 1430 Broadway, New York, NY 10018.

- [3] ANSI C37.51-1979, American National Standard Conformance Testing of Metal-Enclosed Low-Voltage AC Power Circuit Breaker Switchgear Assemblies.

- [4] ANSI Z35.1-1972, American National Standard Specifications for Accident Prevention Signs.

- [5] ANSI Z55.1-1967 (R 1973), American National Standard Gray Finishes for Industrial Apparatus and Equipment.

- [6] ANSI/IEEE C37.09-1979, IEEE Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis.³

- [7] ANSI/IEEE C37.2-1979, IEEE Standard Electrical Power System Device Function Numbers.

- [8] ANSI/IEEE C37.13-1981, IEEE Standard for Low-Voltage AC Power Circuit Breakers Used in Enclosures.

- [9] ANSI/IEEE C37.14-1979, IEEE Standard for Low-Voltage DC Power Circuit Breakers Used in Enclosures.

- [10] ANSI/IEEE C37.24-1971 (R 1984), IEEE Guide for Evaluating the Effect of Solar Radiation on Outdoor Metal-Clad Switchgear.

- [11] ANSI/IEEE C37.26-1972 (R 1976), IEEE Standard Guide for Methods of Power-Factor Measurement for Low-Voltage Inductive Test Circuits.

- [12] ANSI/IEEE C37.100-1981, IEEE Standard Definitions for Power Switchgear.

³ ANSI/IEEE publications are available from the Institute of Electrical and Electronics Engineers, Service Center, 445 Hoes Lane, PO Box 1331, Piscataway, NJ 08855-1331.

- [13] ANSI/IEEE C57.13-1978 (R 1986), IEEE Standard Requirements for Instrument Transformers.
- [14] ANSI/IEEE Std 1-1986, IEEE Standard General Principles for Temperature Limits in the Rating of Electric Equipment and for the Evaluation of Electrical Insulation.
- [15] ANSI/IEEE Std 4-1978, IEEE Standard Techniques for High-Voltage Testing.
- [16] ANSI/IEEE Std 100-1984, IEEE Standard Dictionary of Electrical and Electronics Terms.
- [17] ANSI/IEEE Std 141-1986, IEEE Recommended Practice for Electric Power Distribution for Industrial Plants.
- [18] ANSI/IEEE Std 142-1982, IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems.
- [19] ANSI/IEEE Std 241-1983, IEEE Recommended Practice for Electric Power Systems in Commercial Buildings.
- [20] ANSI/IEEE Std 242-1986, IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.
- [21] ANSI/IEEE Std 344-1975, IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.
- [22] ANSI/IEEE Std 446-1987, IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications.
- [23] ANSI/NFPA 70-1987, National Electrical Code.⁴
- [24] ANSI/UL 486A-1982, Wire Connectors and Soldering Lugs for Use With Copper Conductors.⁵
- [25] ASTM B117-85, Standard Method of Salt Spray (Fog) Testing.⁶
- [26] ASTM D229-82, Standard Method of Testing Rigid Sheet and Plate Materials Used for Electrical Insulation.
- [27] ASTM D714-56 (R 1981), Standard Method of Evaluating Degree of Blistering of Paints.
- [28] ASTM D1535-80, Standard Method of Specifying Color by the Munsell System.
- [29] ASTM D1654-79 (R 1984), Standard Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- [30] ASTM G21-70 (R 1980), Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- [31] NEMA CC 1-1975, Electric Power Connectors for Substations.⁷
- [32] NEMA WC5-1973, Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (ICEA S-61-402).
- [33] NEMA WC7-1971 (R 1976), Cross-Linked-Thermosetting Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (ICEA S-66-524).
- [34] NEMA Bulletin No 77-1973 (R 1975), Guide Lines for Warning Labels.

2. Definitions

The definitions of terms contained in this standard, or in other standards referred to in this standard, are not intended to embrace all legitimate meanings of the terms. They are applicable only to the subject treated in this standard.

If a term is not defined in this standard, the definition in ANSI/IEEE C37.100-1981 [12]⁸ applies. An asterisk (*) following a definition indicates that the definition in this standard is not contained in ANSI/IEEE C37.100-1981 [12] while a dagger (†) indicates the definition differs from that in ANSI/IEEE C37.100-1981 [12].

2.1 switchgear. A general term covering switching and interrupting devices and their combination with associated control, instru-

⁴The National Electrical Code is published by the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269. Copies are also available from the Sales Department, American National Standards Institute, 1430 Broadway, New York, NY 10018.

⁵ANSI/UL publications are available from Underwriters Laboratories Inc, Publication Stock, 333 Pfingsten Road, Northbrook, IL 60062.

⁶ASTM publications are available from American Society for Testing and Materials, 1916 Race St, Philadelphia, PA 19103.

⁷NEMA publications are available from the National Electrical Manufacturers Association, 2101 L Street, NW, Washington, DC 20037.

⁸The numbers in brackets correspond to those of the references in 1.2.