

IEEE Standard for Metal-Clad and Station-Type Cubicle Switchgear

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

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Abstract: Metal-enclosed medium voltage switchgear (ME), which can contain either drawout electrically operated circuit breakers or stationary electrically operated circuit breakers in individual three-pole grounded metal compartments, is covered. Further, metal-clad switchgear (MC) is compartmentalized to isolate all components such as instrumentation, main bus, and both incoming and outgoing connections with grounded metal barriers. Rated maximum voltage levels for metal-clad switchgear (MC) range from 5 kV through 38 kV with main bus continuous current ratings of 1200 A, 2000 A, and 3000 A. Rated maximum voltage levels for station-type cubicle switchgear (SC) range from 15.5 kV through 72.5 kV with main bus continuous current ratings of 2000 A, 3000 A, 4000 A, and 5000 A. ME switchgear also contains associated control, instruments, metering, relaying, protective, and regulating devices as necessary. Service conditions, ratings, temperature limitations, and classification of insulating materials, insulation (dielectric) withstand voltage requirements, test procedures, and application are discussed.

Keywords: common or related terms, control, cumulative loading, cubicle switchgear, current transformers, drawout, indoor, instrumentation, load current-carrying, metal-clad switchgear (MC), metal-enclosed power switchgear (ME), metering, outdoor, protection, qualifying terms, stationary, station-type cubicle switchgear, switchgear assemblies, transformer accuracy, voltage transformers

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Introduction

(This introduction is not a part of IEEE Std C37.20.2-1993, IEEE Standard for Metal-Clad and Station-Type Cubicle Switchgear.)

This standard has been revised to reflect needed technical changes that have been suggested since the original document was published in 1987.

This standard includes the requirements for only metal-clad and station-type cubicle switchgear. These requirements were previously a part of IEEE Std C37.20-1969 (Reaff 1981), IEEE Standard for Switchgear Assemblies Including Metal-Enclosed Bus (1974 consolidated edition). Other types of equipment previously included in IEEE Std C37.20-1969 (Reaff 1981) are incorporated in separate publications.

IEEE Std C37.20-1969¹ had for many years covered all switchgear assemblies, including metal-enclosed bus. Standards committees of the IEEE Switchgear Assemblies Subcommittee and the NEMA Power Switchgear Assemblies Technical Committee recommended that the document be further developed and, where appropriate, that the various sections be identified with their own standards. This approach also identifies with the Conformance Test Procedure Standards.

The IEEE Switchgear Assemblies Committee, in cooperation with the NEMA Power Switchgear Assemblies Technical Committee, was responsible for this revision.

NEMA is responsible for developing clauses 4. and 6.. The Switchgear Assemblies Committee of the IEEE Switchgear Committee is responsible for developing clauses 2, 3, 5, 7, and 8.

This publication is one of a series covering Switchgear Assemblies as follows (see figure A):

IEEE Std C37.20.1-1993	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear (1000 V and Below)
IEEE Std C27.20.2-1993	Metal-Clad and Station-Type Cubicle Switchgear (Above 1000 V)
IEEE Std C37.20.3-1987	Metal-Enclosed Interrupter Switchgear (Above 1000 V)
IEEE Std C37.21-1985	Control Switchboards
IEEE Std C37.23-1987	IEEE Standard for 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. Further suggestions for improvement gained in the use of this standard will be welcomed.

¹IEEE Std C37.20-1969 has been withdrawn. This standard was delineated into the various branches of the IEEE Std C37.20 series.

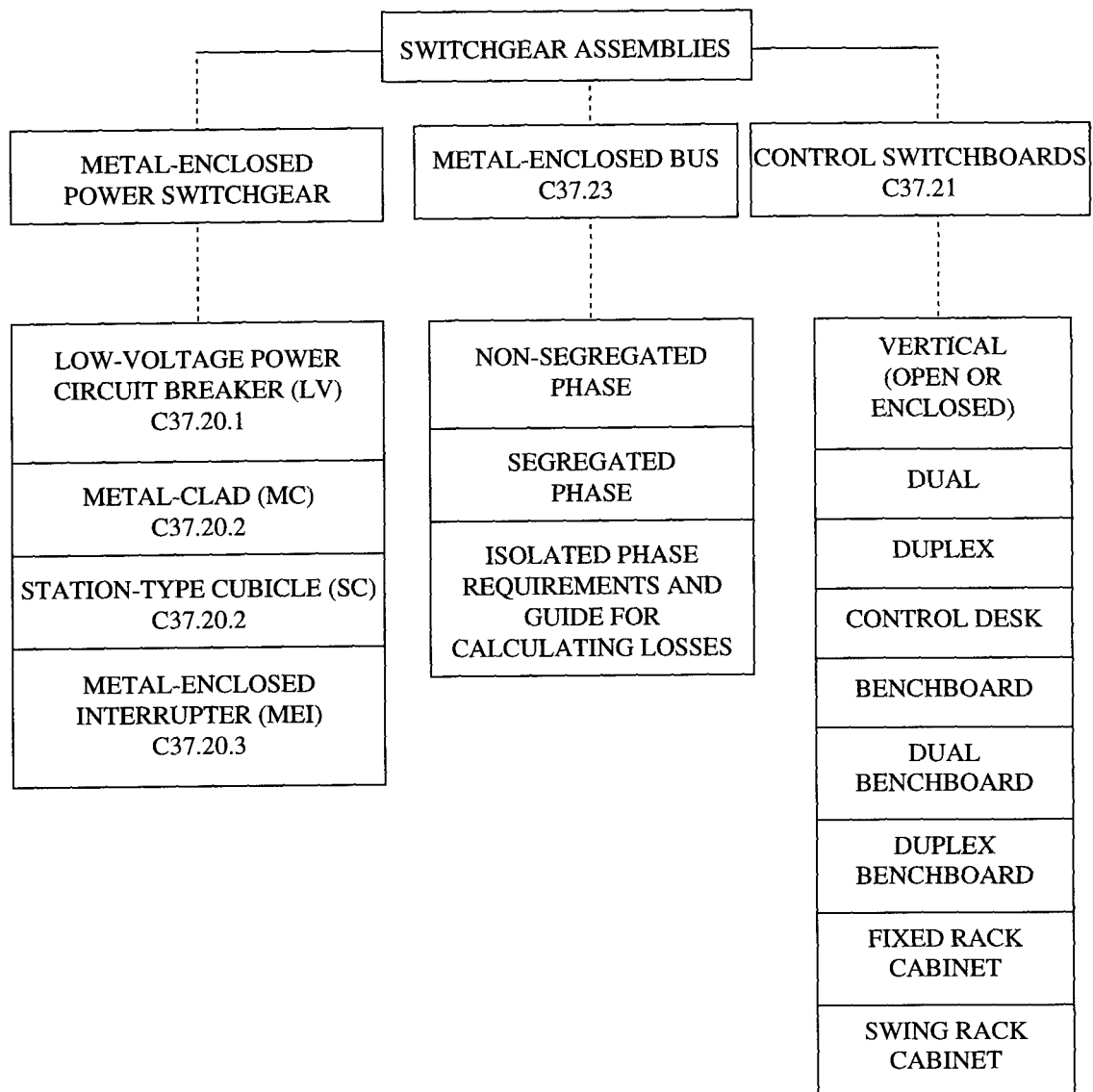


Figure A —Types of switchgear assemblies

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IEEE Standard for Metal-Clad and Station-Type Cubicle Switchgear

1. Overview

1.1 Scope

This standard covers metal-clad and station-type cubicle switchgear containing, but not limited to, such devices as power circuit breakers; other interrupting devices; switches; control; instrumentation and metering; and protective and regulating equipment. It includes, but is not specifically limited to, equipment for the control and protection of apparatus used for power generation, conversion, and transmission and distribution.

This standard is concerned with enclosed, rather than open, indoor and outdoor switchgear assemblies rated above 1000 V. It applies to equipment that is part of primary and secondary unit substations. It does not include gas insulated substation equipments.

In this standard metal-clad switchgear shall be called MC switchgear, and station-type cubicle switchgear shall be called SC switchgear. Whenever the data covers both types of equipments, they shall be called ME switchgear.

1.2 References

This standard shall be used in conjunction with the following publications. When the standards referenced in this document are superseded by an approved revision, the revision shall apply.

Accredited Standards Committee C2-1993, National Electrical Safety Code.¹

ANSI C37.06-1987, American National Standard for Switchgear—AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis—Preferred Ratings and Related Required Capabilities.²

ANSI C37.11-1979, American National Standard Requirements for Electrical Control for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis and a Total Current Basis.

¹The NESC is available from the IEEE, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA.

²ANSI publications are available from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA.

ANSI Z535.4-1991, American National Standard for Product Safety Signs and Labels.

ANSI/NFPA 70-1993, National Electrical Code.³

ANSI/UL 486A-1991, Wire Connectors and Soldering Lugs for Use With Copper Conductors.⁴

ASTM B117-90, Standard Test Method of Salt Spray (FOG) Testing.⁵

ASTM D229-91, Standard Method of Testing Rigid Sheet and Plate Materials Used for Electrical Insulation.

ASTM D714-87, Standard Method for Evaluating Degree of Blistering of Paints.

ASTM D1535-89, Standard Method for Specifying Color by The Munsell System.

ASTM D1654-79a (R 1984), Standard Method for Evaluation of Painted or Coated Specimens Subjected, to Corrosive Environments.

ASTM D2303-90, Standard Test Method for Liquid-Contaminant, Inclined-Plane Tracking and Erosion of Insulating Materials.

ASTM G21-90, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

IEEE Std 1-1986, IEEE Standard General Principles for Temperature Limits in the Rating of Electric Equipment and for the Evaluation of Electrical Insulation (ANSI).⁶

IEEE Std 4-1978, IEEE Standard Techniques for High-Voltage Testing (ANSI).

IEEE Std 100-1992, The New IEEE Standard Dictionary of Electrical and Electronics Terms (ANSI).

IEEE Std 141-1993, IEEE Recommended Practice for Electric Power Distribution for Industrial Plants (IEEE Red Book).

IEEE Std 241-1990, IEEE Recommended Practice for Electric Power Systems in Commercial Buildings (IEEE Gray Book) (ANSI).

IEEE Std 242-1986 (Reaff 1991), IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (ANSI) (IEEE Buff Book).

IEEE Std 344-1987, IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations (ANSI).

IEEE Std 446-1987, IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications (IEEE Orange Book) (ANSI).

IEEE Std C37.04-1979 (Reaff 1988), IEEE Standard Rating Structure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis (ANSI).

³The 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, 11 West 42nd Street, 13th Floor, New York, NY 10018, USA.

⁴ANSI/UL publications are available from the Underwriters Laboratories Inc, Publication Stock, 333 Pfingsten Road, Northbrook, IL 60062. Copies are also available from the Sales Department, American National Standard Institute, 11 West 42nd Street, 13th Floor, New York, NY, 10036, USA.

⁵ASTM publications are available from the American Society for Testing and Materials, 1916 Race St, Philadelphia, PA 19103, USA.

⁶IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08854-1331, USA.

IEEE Std C37.010-1979, IEEE Standard Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis (ANSI).

IEEE Std C37.2-1991, IEEE Standard Electrical Power System Device Function Numbers (ANSI).

IEEE Std C37.100-1992, IEEE Standard Definitions for Power Switchgear (ANSI).

IEEE PC37.20.4, Standard for Indoor AC Medium-Voltage Switches for Use in Metal-Enclosed Switchgear. April 26, 1994/D20.⁷

IEEE Std C37.24-1986, IEEE Guide for Evaluating the Effect of Solar Radiation on Outdoor Metal-Enclosed Switchgear (ANSI).

IEEE Std C37.55-1989, IEEE Conformance Test Procedures for Metal-Clad Switchgear Assemblies (ANSI).

IEEE Std C37.81-1989, IEEE Guide for Seismic Qualification of Class 1E Metal-Enclosed Power Switchgear Assemblies (ANSI).

IEEE Std C37.90.1-1989, IEEE Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems (ANSI).

IEEE Std C37.90.2-1987, IEEE Trial-Use Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interferences from Transceivers (ANSI).

IEEE Std C57.13-1993, IEEE Standard Requirements for Instrument Transformers.

NEMA CCI-1993, Electrical Power Connectors for Substations.⁸

NEMA LII-1989, Industrial Laminated Thermosetting Products.

NEMA WC5-1992/ICEA S-61-402, Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

NEMA WC7-1991/ICEA S-66-524, Cross-Linked Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

NEMA 260-1991, Safety Labels for Padmounted Switchgear and Transformers Sited in Public Areas.

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 IEEE C37.100-1992⁹ applies. An asterisk (*) following a definition indicates that the definition in this standard is not contained in IEEE Std C37.100-1992, while a dagger (†) indicates the definition differs from that in IEEE Std C37.100-1992.

⁷This authorized standards project, PC37.20.4, was not approved by the IEEE Standards Board at the time this went to press. It is available from the IEEE Service Center.

⁸NEMA publications are available from the National Electrical Manufacturers Association, 2101 L Street, NW, Washington, DC 20037, USA.

⁹Information on references can be found in 1.2.

2.1 General

2.1.1 ambient air temperature: The temperature of the surrounding air that comes in contact with equipment.

NOTE — Ambient air temperature, as applied to enclosed switchgear assemblies, is the average temperature of the surrounding air that comes in contact with the enclosure (see 5.2.2.3 for method of measurement).

2.1.2 auxiliary compartment: That portion of the switchgear assembly that is assigned to the housing of auxiliary equipment, such as potential transformers, control power transformers, or other miscellaneous devices.*

2.1.3 circuit breaker compartment: That portion of the switchgear assembly that contains one circuit breaker or other removable primary interrupting device and the associated primary conductors.*

2.1.4 conformance tests: Conformance tests demonstrate compliance with the applicable standards. The test specimen is normally subjected to all planned production tests prior to initiation of the conformance test program.†

NOTE — The conformance tests may, or may not, be similar to certain design tests. Demonstration of margin (capabilities) beyond the standards is not required.

2.1.5 design tests: Tests made by the manufacturer to determine the adequacy of the design of a particular type, style, or model of equipment or its component parts to meet its assigned ratings and to operate satisfactorily under normal service conditions or under special conditions if specified, and may be used to demonstrate compliance with applicable standards of the industry.†

NOTES:

1 — Design tests are made on representative apparatuses or prototypes to verify the validity of design analyses and calculation methods and to substantiate the ratings assigned to all other apparatuses of basically the same design. These tests are not intended to be made on every design variation or to be used as part of normal production. The applicable portion of these design tests may also be used to evaluate modifications of a previous design and to ensure that performance has not been adversely affected. Test data from previous similar designs may also be used for current designs, where appropriate. Once made, the tests need not be repeated unless the design is changed so as to modify performance.

2 — *Design tests* are sometimes called *type tests*.

2.1.6 field tests (for switchgear): Tests made after the assembly has been installed at its place of utilization.

2.1.7 ground and test device: A term applied to a switchgear assembly accessory device which can be inserted in place of a drawout circuit breaker for the purposes of (1) grounding the main bus and/or external circuits connected to the switchgear assembly and/or (2) primary circuit testing.

2.1.8 production tests: Tests made for quality control by the manufacturer on every device or representative samples, or on parts, or materials required to verify during production that the product meets the design specifications and applicable standards.†

NOTES:

1 — Certain quality assurance tests on identified critical parts of repetitive high-production devices may be tested on a planned statistical sampling basis.

2 — *Production Tests* are sometimes called *routine tests*.

2.1.9 switchgear: A general term covering switching and interrupting devices and their combination with associated control, instruments, metering, protective, and regulating devices; also assemblies of these devices with associated interconnections, accessories, and supporting structures used primarily in connection with the generation, transmission, distribution, and conversion of electric power.†

2.1.9.1 switchgear assembly (see figure A in the introduction): An assembled equipment (indoor or outdoor) including, but not limited to, one or more of the following: switching, interrupting, control, instrumentation, metering, protective, and regulating devices; together with their supporting structures, enclosures, conductors, electrical interconnections, and accessories.†

2.1.9.2 metal-enclosed power switchgear (ME): A switchgear assembly completely enclosed on all sides and top with sheet metal (except for ventilating openings and inspection windows) containing primary power circuit switching

or interrupting devices, or both, with buses and connections. The assembly may include control and auxiliary devices. Access to the interior of the enclosure is provided by doors or removable covers, or both.†

2.1.9.3 metal-clad switchgear (MC): Switchgear that is characterized by the following necessary features:

- a) The main switching and interrupting device is of the removable (drawout) type arranged with a mechanism for moving it physically between connected and disconnected positions and equipped with self-aligning and self-coupling primary disconnecting devices and disconnectable control wiring connections.
- b) Major parts of the primary circuit, that is, the circuit switching or interrupting devices, buses, voltage transformers, and control power transformers, are completely enclosed by grounded metal barriers, that have no intentional openings between compartments. Specifically included is a metal barrier in front of, or a part of, the circuit interrupting device to ensure that, when in the connected position, no primary circuit components are exposed by the opening of a door.
- c) All live parts are enclosed within grounded metal compartments.
- d) Automatic shutters that cover primary circuit elements when the removable element is in the disconnected, test, or removed position.
- e) Primary bus conductors and connections are covered with insulating material throughout.
- f) Mechanical interlocks are provided for proper operating sequence under normal operating conditions.
- g) Instruments, meters, relays, secondary control devices and their wiring are isolated by grounded metal barriers from all primary circuit elements with the exception of short lengths of wire such as at instrument transformer terminals.
- h) The door through which the circuit-interrupting device is inserted into the housing may serve as an instrument or relay panel, and may also provide access to a secondary or control compartment within the housing.

NOTES:

- 1 — Auxiliary vertical sections may be required for mounting devices or for use as a bus transition.
- 2 — The term metal-clad (as applied to switchgear assemblies) is correctly used only in connection with switchgear conforming fully to the definition for metal-clad switchgear given in 2.1.9.3. Metal-clad switchgear is metal-enclosed, but not all metal-enclosed switchgear can be correctly designated as metal-clad.

2.1.9.4 station-type cubicle switchgear (SC): Metal-enclosed power switchgear characterized by the following required features:

- a) The main switching and interrupting device is of the stationary mounted type, composed of a primary circuit compartment and a secondary or mechanism compartment. It is also arranged with gang-operated isolating switches that are mechanically interlocked with the main switching and interrupting device.
- b) Each phase for the major parts of the primary circuit switching or interrupting devices, buses, and line-to-ground potential transformers is completely enclosed (or segregated) by grounded metal barriers that have no intentional openings between compartments. Specifically included are mechanically interlocked doors in front of, or a part of, the primary circuit compartment of the circuit switching and interrupting device so that when the group-operated isolating switches are closed, no primary parts can be exposed by the attempted opening of the interlocked doors.
- c) All live parts are enclosed within grounded metal compartments.
- d) Primary bus conductors and connections are bare.
- e) Mechanical interlocks are provided for proper operating sequence under normal operating conditions.
- f) Secondary control devices and their wiring are isolated by grounded metal barriers from all primary circuit elements with the exception of short lengths of wire such as at instrument transformer terminals.
- g) The doors to the secondary or mechanism compartment of the primary switching or interrupting device are to provide access to the secondary or control equipment within the housing without danger to exposure to the primary circuit parts.

NOTE — Auxiliary vertical sections may be required for mounting devices or for use as a bus transition.

2.1.10 vertical section: That portion of the switchgear assembly between two successive vertical delineations and may contain one or more circuit breakers, auxiliary compartments, and associated primary conductors.†

2.2 Qualifying terms

The following qualifying terms are defined in IEEE Std 100-1992 and the user is referred to the definitions given therein:

2.2.1 accessible

2.2.2 alive (live)

2.2.3 automatic (self-coupling)

2.2.4 enclosed

2.2.5 insulating

2.2.6 isolated

2.2.7 ventilated

The following qualifying terms are defined in IEEE Std C37.100-1992 and the user is referred to the definitions given therein:

2.2.8 electrical

2.2.9 enclosure

2.2.10 flame-resistant (retardant)

2.2.11 indoor

2.2.12 metal-enclosed

2.2.13 outdoor

2.2.14 resistant (suffix)

2.2.15 secondary

2.2.16 ventilated enclosure

2.3 Common or related terms

The following common or related terms are defined in IEEE C37.100-1992 and the user is referred to the definitions given therein:

2.3.1 asymmetrical

2.3.2 auxiliary switch

2.3.3 barrier

2.3.4 bus

2.3.5 connected position**2.3.6 continuous current tests****2.3.7 current-limiting fuse****2.3.8 disconnected position****2.3.9 drawout-mounted device****2.3.10 ground bus****2.3.11 live parts****2.3.12 main (primary switchgear connections)****2.3.13 normal frequency****2.3.14 primary disconnecting devices****2.3.15 removable element****2.3.16 secondary and control wiring****2.3.17 secondary disconnecting contact****2.3.18 shutter****2.3.19 silver surfaced****2.3.20 stationary mounted device****2.3.21 symmetrical****2.3.22 terminal****2.3.23 terminal block****2.3.24 test position****3. Service conditions**

Standards for the design and performance of ME switchgear are based on usual service conditions as described below. The selection of equipment for a particular application can be based on the construction and ratings as defined in this standard provided that the following usual service conditions exist:

- a) The temperature of the cooling air (ambient air temperature) surrounding the enclosure of the ME switchgear is within the limits of $-30\text{ }^{\circ}\text{C}$ and $+40\text{ }^{\circ}\text{C}$.
- b) The altitude of the installation does not exceed 3300 ft (1000 m).
- c) The effect of solar radiation is not significant. (The principles stated in IEEE Std C37.24-1986 may be used for guidance.)
- d) Unusual service conditions, such as outlined in 7.1, do not prevail.

4. Ratings

4.1 General

The ratings of a switchgear assembly are designations of operating limits under specified conditions of ambient temperature, temperature rise, etc. Where the switchgear assembly comprises a combination of primary and secondary circuits, each may be given ratings.

ME switchgear shall have the following ratings:

- a) Rated maximum voltage
- b) Rated frequency
- c) Rated insulation levels
- d) Rated continuous current
- e) Rated short-time current
- f) Rated momentary current

The designated ratings in this standard are preferred but are not considered to be restrictive.

In addition to these ratings, a switchgear assembly may have interrupting or switching capabilities, which are determined by the rating of the particular interrupting and switching devices that are integral parts of the switchgear assembly. Refer to specific standards for the ratings of these devices.

4.2 Voltage and insulation levels

See table 1.

4.2.1 Rated maximum voltage

The rated maximum voltage of ME switchgear is the highest rms voltage for which the equipment is designed, and is the upper limit for operation.

4.2.2 Rated insulation levels

The rated insulation levels of ME switchgear shall consist of the following two items:

- a) Normal frequency 1 min withstand voltage
- b) Impulse withstand voltage

**Table 1— Voltage and insulation levels
MC and SC switchgear**

	Rated maximum voltage (kV rms)	Insulation levels (kV)		
		Normal frequency withstand (rms)	Impulse withstand	Reference * dc withstand
MC switchgear	4.76	19	60	27
	8.25	36	95	50
	15.0	36	95	50
	27.0	60	125	†
	38.0	80	150	
SC switchgear	15.5	50	110	
	38.0	80	150	
	72.5	160	350	
NOTE — For field test values see 5.5.				

*The column headed dc withstand is given as a reference only for those using dc tests to verify the integrity of connected cable installations without disconnecting the cables from the switchgear. It represents values believed to be appropriate and approximately equivalent to the corresponding normal frequency withstand test values specified for each voltage rating of switchgear. The presence of this column in no way implies any requirement for a dc withstand test on ac equipment or that a dc withstand test represents an acceptable alternative to the normal-frequency withstand tests specified in this standard, either for design tests, production tests, conformance tests, or field tests. When making dc tests, the voltage should be raised to the test value in discrete steps and held for a period of 1 min.

†Because of the variable voltage distribution encountered when making dc withstand tests, the manufacturer should be contacted for recommendations before applying dc withstand tests to the switchgear. Voltage transformers above 34.5 kV should be disconnected when testing with dc. See clause 8 of IEEE C57.13-1993, and in particular 8.8.2 (the last paragraph) which reads, "Periodic kenotron tests should not be applied to transformers of higher than 34.5 kV voltage rating."

4.2.3 Voltages and insulation levels

The rated maximum voltages, and corresponding insulation levels for ME switchgear, are listed in table 1.

4.3 Rated frequency

The rated frequency of a device, or an assembly, is the frequency of the circuit for which it is designed (ratings are based on a frequency of 60 Hz).

4.4 Rated current

4.4.1 Rated continuous current

The rated continuous current of ME switchgear is the maximum current in rms amperes at rated frequency, which can be carried continuously by the primary circuit components, including buses and connections, without causing temperatures in excess of specified limits for

- a) Any primary or secondary circuit component
- b) Any insulating medium, or structural or enclosing member

The specified temperature limits applicable to switchgear assemblies are given in 4.5.1 through 4.5.6.

4.4.2 Continuous current ratings

The continuous current ratings of the main bus in ME switchgear are listed in table 2.

The continuous current rating of the individual circuit breaker compartment shall be equal to the ratings of the switching and interrupting devices used, except as may be modified by lower continuous current ratings for current transformers, power fuses etc.

**Table 2— MC and SC switchgear
continuous current ratings of main bus**

	Rated continuous current of buses (A)
MC switchgear	1200/2000/3000
SC switchgear	2000/3000/4000/5000

4.4.3 Rated momentary current

The rated momentary current of ME switchgear is the maximum rms total current that it shall be required to withstand. The current shall be the rms value, including the dc component, at the major peak of the maximum cycle as determined from the envelope of the current wave during a test period of at least 10 cycles unless limited to a shorter time by the protective device.

4.4.4 Momentary current rating

The momentary current rating of the individual circuit breaker compartments of ME switchgear shall be equal to either of the following:

- a) The circuit breaker close and latch, or
- b) Switch fault close, or
- c) Asymmetrical momentary current ratings of the switching devices used (See ANSI C37.06-1987 and IEEE PC37.20.4)

4.4.5 Rated short-time current

The rated short-time current of the ME switchgear is the average rms current that it shall carry for a period of 2 s unless limited to a shorter time by the protective device or current transformer ratings.

4.4.6 Short-time current rating

The short-time current ratings of the individual circuit-breaker compartments of the ME switchgear shall be equal to the short-time ratings of the switching and protective devices used or the short-time rating of the current transformers for a period not to exceed 2 s (see IEEE Std C57.13-1993, ANSI C37.06-1987, and IEEE PC37.20.4).

4.5 Temperature limitations

4.5.1 Limiting temperature

The limiting temperature for ME switchgear is the maximum temperature permitted

- a) For any component, such as insulation, buses, instrument transformers, and switching and interrupting devices