

IEEE Standard for Metal-Enclosed Bus

IEEE Power and Energy Society

Sponsored by the
Switchgear Committee

IEEE
3 Park Avenue
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USA

IEEE Std C37.23™-2015
(Revision of
IEEE Std C37.23-2003)

IEEE Standard for Metal-Enclosed Bus

Sponsor

Switchgear Committee
of the
IEEE Power and Energy Society

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Abstract: Metal-enclosed (ME) bus assemblies for indoor and outdoor use are discussed in this standard. The types of assemblies covered are nonsegregated-phase bus, cable bus, segregated-phase bus, and isolated-phase bus. Rated maximum voltages of ac ME bus assemblies range from 1058 V through 38 kV with continuous-current ratings of 600 A through 26 000 A for self-cooled ratings and up to 50 000 A for forced-cooled ratings. Rated maximum voltage levels of dc ME bus assemblies range from 300 V through 3200 V with continuous-current ratings of 600 A through 15 000 A. Service conditions, ratings, temperature limitations and classification of insulating materials, insulation (dielectric) withstand voltage requirements, test procedures, and application are discussed. A guide for calculating losses in isolated-phase bus is included.

Keywords: cable bus, IEEE C37.23™, isolated-phase bus, metal-enclosed bus, nonsegregated-phase bus, segregated-phase bus

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Introduction

This introduction is not part of IEEE Std C37.23™-2015, IEEE Standard for Metal-Enclosed Bus.

This standard has been revised to reflect needed technical changes that have been suggested since the last revision of IEEE Std C37.23 in 2003. The major revision is the addition of cable bus (bus with flexible conductors), which had been removed in the 2003 edition. Other significant changes are as follows:

- Revision of text throughout for greater harmony with related standards, including IEEE Std C37.20.1™ [B14], IEEE Std C37.20.2™, and IEEE Std C37.20.3™ [B15].^{1, 2}
- Refinement of information in the application section.
- Revision of the ratings tables for inclusion of extended ratings.
- Short-circuit ratings for ME bus assemblies rated 1058 V have been introduced in this revision and the short-time test has also been revised to align and harmonize with ratings and test requirements of IEEE Std C37.20.1. However, this revision is not intended to imply or require that any additional tests of existing ME bus assemblies qualified to the previous edition of this standard are necessary.

It is also noted that the historic altitude correction factors listed in Table C.2 of this standard have been retained.

This standard includes only the requirements for ME bus. These requirements were previously a part of IEEE Std C37.20™-1969, IEEE Standard for Switchgear Assemblies Including Metal-Enclosed Bus (1974, consolidated edition). Other types of equipment previously included in IEEE Std C37.20-1969 are incorporated in separate publications.

IEEE Std C37.20-1969 had for many years covered all switchgear assemblies, including ME bus. Standards committees of the IEEE Switchgear Assemblies Subcommittee and the NEMA Power Switchgear Assemblies Technical Committee recommended that the standard be further developed and, where appropriate, that the various sections be identified with their own standards. This approach also coordinates with the conformance test procedure standards.

The IEEE Switchgear Assemblies Subcommittee was responsible for this revision.

This publication is one of a series covering switchgear assemblies, as follows:

IEEE Std C37.20.1	IEEE Standard for Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear [B14]
IEEE Std C37.20.2	IEEE Standard for Metal-Clad Switchgear
IEEE Std C37.20.3	IEEE Standard for Metal-Enclosed Interrupter Switchgear (1 kV–38 kV) [B15]

¹ The numbers in brackets correspond to those of the bibliography in Annex E.

² Information on references can be found in Clause 2.

IEEE Std C37.20.4™	IEEE Standard for Indoor AC Switches (1 kV–38 kV) for Use in Metal-Enclosed Switchgear [B16]
IEEE Std C37.21™	IEEE Standard for Control Switchboards [B17]
IEEE Std C37.23™	IEEE Standard for Metal-Enclosed Bus
IEEE Std C37.24™	IEEE Guide for Evaluating the Effect of Solar Radiation on Outdoor Metal-Enclosed Switchgear
IEEE Std C37.100.1™	IEEE Standard of Common Requirements for High Voltage Power Switchgear Rated Above 1000 V

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1. Overview

1.1 Scope

This standard covers assemblies of metal-enclosed (ME) conductors along with associated interconnections, enclosures, and supporting structures. The types of assemblies covered are nonsegregated-phase bus, segregated-phase bus, isolated-phase bus, and cable bus. When switches and disconnecting links are included, they shall conform to this standard. This standard encompasses the performance characteristics of indoor and outdoor conductor assemblies with rated maximum operating voltages through 38 kV. This standard does not pertain to UL 857 [B22] type busways and associated fittings.³

Service conditions, ratings, temperature limitations, and classification of insulating materials, insulation (dielectric) withstand voltage requirements, test procedures, and applications are established. A guide for calculating losses in isolated-phase bus is included.

1.2 Purpose

The purpose of this standard is to:

- a) Establish minimum construction requirements
- b) Establish preferred ratings
- c) Establish testing and performance requirements
- d) Provide application guidance for the ME bus types covered by this standard.

³ The numbers in brackets correspond to those of the bibliography in Annex E.

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.

ANSI/NEMA C29.1, American National Standard Test Methods for Electrical Power Insulators.^{4, 5}

ANSI/NEMA WC 71/ICEA S-96-659, Nonshielded Cables Rated 2001–5000 V for Use in the Distribution of Electric Energy.

ASTM A90/A90M, Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.⁶

ASTM D229, Standard Test Methods for Rigid Sheet and Plate Materials Used for Electrical Insulation.

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

ASTM D1535, Standard Practice for Specifying Color by the Munsell System.

ASTM D1654-2008, Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.

IEEE Std 4™, IEEE Standard Techniques for High-Voltage Testing.^{7, 8}

IEEE Std 693™, IEEE Recommended Practice for Seismic Design of Substations.

IEEE Std 835™, IEEE Standard Power Cable Ampacity Tables.

IEEE Std C37.09™, IEEE Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis.

IEEE Std C37.20.2™, IEEE Standard for Metal-Clad Switchgear.

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

IEEE Std C37.100.1™-2007, IEEE Standard of Common Requirements for High Voltage Power Switchgear Rated Above 1000 V.

NEMA WC 70/ICEA S-95-658, Power Cables Rated 2000 V or Less for the Distribution of Electrical Energy.⁹

NEMA WC 74/ICEA S-93-639, 5–46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy.

⁴ ANSI publications are available from the American National Standards Institute (<http://www.ansi.org/>).

⁵ ICEA publications are available from the Insulated Cable Engineers Association (<http://www.icea.net/>).

⁶ ASTM publications are available from the American Society for Testing and Materials (<http://www.astm.org/>).

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⁹ NEMA publications are available from Global Engineering Documents (<http://global.ihs.com/>).

NFPA 70[®], 2014 Edition, National Electrical Code[®] (NEC[®]).^{10, 11}

UL 486A-486B, UL Standard for Safety Wire Connectors.¹²

UL 1332, UL Standard for Safety Organic Coatings for Steel Enclosures for Outdoor Use Electrical Equipment.

3. Definitions

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary Online* should be consulted for terms not defined in this clause.¹³

ambient air temperature: The temperature of the surrounding air that comes in contact with equipment. Ambient air temperature, as applied to metal-enclosed (ME) bus assemblies, is the average temperature of the surrounding air that comes in contact with the enclosure.

cable bus: An assembly of units or sections with insulated conductors having associated fittings forming a structural system used to securely fasten or support conductors and conductor terminations in a completely enclosed, ventilated, protective metal housing. This assembly is designed to carry fault current and to withstand the magnetic forces of such current.

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NOTE 2—*Cable bus* is ordinarily assembled at the point of installation from the components furnished or specified by the manufacturer in accordance with instructions for the specific job.

cable termination kit: A device used for terminating power cables having laminated or extruded insulation rated 2.5 kV and above.

NOTE—See IEEE Std 48™ [B8].

design tests: Those tests made to determine the adequacy of a particular type, style, or model of metal-enclosed (ME) bus or its component parts to meet its assigned ratings and to operate satisfactorily under normal service conditions or under special conditions, if specified.

drip-proof enclosure: An enclosure, usually for indoor application, so constructed or protected that falling drops of liquid or solid particles that strike the enclosure at any angle not greater than 15 degrees from the vertical shall not interfere with the successful operation of metal-enclosed (ME) bus.

enclosure: A surrounding case or housing used to protect the contained conductor and prevent personnel from accidentally contacting live parts.

field tests: Tests made after the assembly has been installed at its place of utilization.

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¹¹ The NEC is published by the National Fire Protection Association (<http://www.nfpa.org/>). It is also available from the IEEE at <http://www.techstreet.com/ieeegate.html>.

¹² UL standards are available from Global Engineering Documents (<http://www.global.ihs.com/>).

¹³ The *IEEE Standards Dictionary: Glossary of Terms & Definitions* is available at <http://dictionary.ieee.org/>.

¹⁴ Notes in text, tables, and figures of a standard are given for information only and do not contain requirements needed to implement this standard.

interleaving: A method of arranging the cables within a cable bus system so that a better balance is maintained for the currents both between phases and between the cables within a particular phase. This may be done either at the terminations or throughout the cable bus system.

metal-enclosed (ME) bus: An assembly of conductors with associated connection joints and insulating supports within a grounded metal enclosure.

metal-enclosed (ME) (as applied to ME bus): Surrounded by a metal case or housing, with provisions for grounding.

nonventilated enclosure: An enclosure so constructed as to provide no intentional circulation of external air through the enclosure.

production tests [metal-enclosed (ME) bus]: 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.

NOTE—Production tests are sometimes called *routine tests*.

support components: Basic subassemblies of the enclosure that add either strength or rigidity or both to the metal-enclosed (ME) bus enclosure.

termination (terminal chamber): A metal enclosure that contains all necessary mechanical and electrical items to complete the connections to other equipment.

transposition: A metal-enclosed (ME) bus conductor arrangement consisting of three-phase conductors that are evenly transposed in a length of ME bus by interchanging their physical location so that each phase is under an equal inductive effect (proximity effect) produced by the other two phases

types of metal enclosed (ME) bus assemblies: In general, the following four basic types of construction are used: nonsegregated-phase, segregated-phase, isolated-phase, and cable bus.

- a) *Nonsegregated-phase bus:* One in which all phase conductors are in a common metal enclosure without barriers between the phases.
- b) *Segregated-phase bus:* One in which all phase conductors are in a common metal enclosure but are segregated by metal barriers between phases.
- c) *Isolated-phase bus:* One in which each phase conductor is enclosed by an individual metal housing separated from the adjacent conductor housing by an air space. The bus may be self-cooled or may be forced-cooled by means of circulating a gas or liquid.
- d) *Cable bus:* One in which insulated cables are used as the primary phase conductors. Normally this is similar to nonsegregated-phase bus in design in that all phase conductors are in a common enclosure without metal barriers between the phases. Cable bus may have one or multiple cables per phase, depending on the required phase current. See Figure 1.

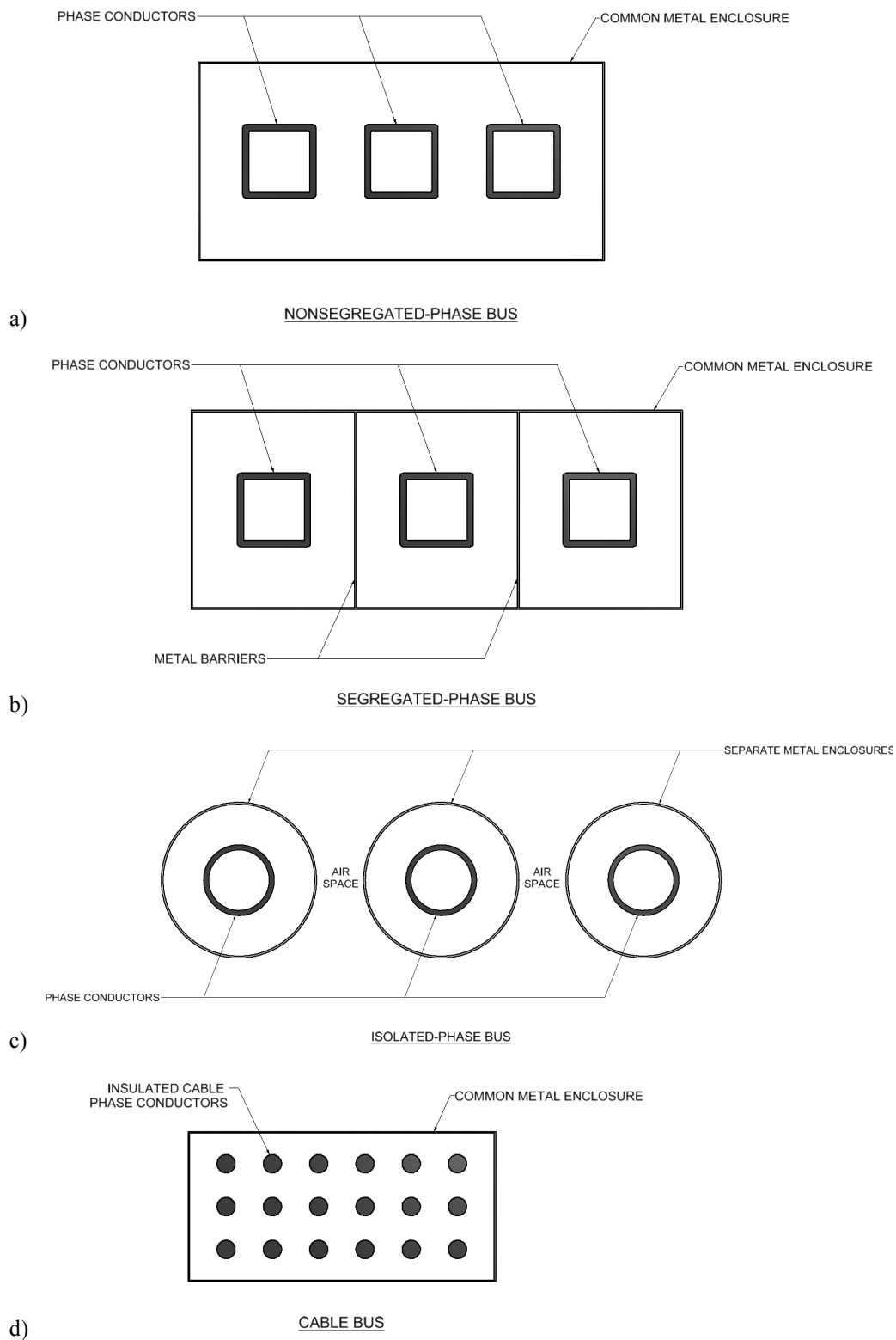


Figure 1—Types of metal-enclosed bus assemblies

ventilated enclosure: An enclosure provided with means to permit circulation of external air to remove heat, fumes, or vapors.

NOTE—Ventilating openings or louvers are usually filtered, screened, or restricted to limit the entrance of dust, dirt, rain, or other foreign objects.

4. Normal (usual) service conditions

Standards for the design and performance of ME bus assemblies are based on usual service conditions described as follows. 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 bus assembly is within the limits of $-30\text{ }^{\circ}\text{C}$ and $+40\text{ }^{\circ}\text{C}$.
- b) For ME bus assembly with rated maximum voltages up to 1058 V ac and 3200 V dc, the altitude of the installation does not exceed 2000 m above sea level. For ME bus assembly with rated maximum voltages above 1058 V ac, the altitude of the installation does not exceed 1000 m above sea level.
- c) The effect of solar radiation is not significant. (The principles stated in IEEE Std C37.24 may be used for guidance.)
- d) The ambient air is not significantly polluted and would be classified as having pollution level I “light” according to IEEE Std C37.100.1-2007, Table C.1.¹⁵
- e) The conditions of humidity are as follows:
 - 1) The average value of the relative humidity measured over a period of 24 h does not exceed 95%.
 - 2) The average value of the water vapor pressure, over a period of 24 h does not exceed 2.2 kPa.
 - 3) The average value of the relative humidity over a period of one month does not exceed 90%.
 - 4) The average value of the water vapor pressure over a period of one month does not exceed 1.8 kPa.

For these conditions, condensation may occasionally occur.

NOTE 1—Condensation can be expected where sudden temperature changes occur in periods of high humidity.

NOTE 2—To withstand the effects of high humidity and condensation, such as breakdown of insulation or corrosion of metallic parts, ME bus assembly designed for such conditions and tested accordingly should be used.

NOTE 3—Condensation may be prevented by special design of the building or housing, by suitable ventilation and heating of the station or by the use of dehumidifying equipment. Other options include heaters with thermostats/humidistat inside the ME bus enclosure. Condensation may also be due to ground level rainwater or for underground applications, from incoming cable raceways connected to switchgear.

¹⁵ The information listed in items d) through f) is based on IEEE Std C37.100.1-2007, 2.1, and IEC 62271-1, 2.1.

- f) Vibration due to causes external to the ME bus assembly or earth tremors are insignificant¹⁶ relative to the normal operating duties of the equipment and do not exceed the low performance level defined in IEEE Std 693. The manufacturer can assume that, in the absence of specific requirements from the user, there are none.
- g) Unusual service conditions, such as those outlined in Annex C do not prevail.

The user shall review Annex C for unusual service conditions and other considerations when preparing specifications for ME bus because those unusual conditions impact the equipment design.

5. Ratings

5.1 General

The ratings of ME bus are designated limits of operating characteristics based upon the service conditions of Clause 4 and shall include the following:

- a) Rated maximum voltage
- b) Rated power frequency
- c) Rated insulation levels
- d) Rated continuous current
- e) Rated short-time withstand current
- f) Rated momentary withstand current (for ME bus rated over 1.058 kV ac and any dc ME bus)
- g) Rated short-circuit withstand current (for ME bus rated up to 1.058 kV ac)

For forced-cooled bus, both the forced-cooled and the self-cooled continuous-current rating for the same temperature rise shall be given.

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

5.2 Voltage and insulation levels

5.2.1 Rated maximum voltage

The rated maximum voltage of ME bus is the highest rms voltage (for ac ME bus) or dc voltage (for dc ME bus) for which the equipment is designed, and is the upper limit for operation.

5.2.2 Rated insulation levels

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

¹⁶ The interpretation of the term *insignificant* is the responsibility of the user or specifier of the equipment. Either the user is not concerned with seismic events, or his or her analysis shows that the risk is insignificant.

- a) Power frequency withstand voltage
- b) Lightning impulse withstand voltage (rated maximum voltage 4.76 kV and higher)

5.2.3 Voltages and insulation levels

The preferred rated maximum voltages and corresponding insulation levels for ac ME bus are listed in Table 1, Table 2, and Table 3. For dc ME bus ratings, refer to Table 4.

Table 1—Isolated-phase bus—preferred voltage ratings and insulation levels^a

Rated maximum voltage (kV rms)	Insulation levels		
	Power frequency withstand (kV rms)		Lightning impulse withstand (kV peak)
	Dry (1 min)	Dew ^b (10 s)	
15.5	50	50	110
27	60	60	125
38	80	70	150

^a For field test values, see 6.4.3.

^b Dew tests are not required when condensation control is utilized as required for the specified application conditions, or when insulators used have been previously qualified in accordance with ANSI C29.1 dew tests. When required, dew withstand voltage tests shall be made in accordance with ANSI C29.1.

Table 2—Nonsegregated-phase bus—preferred voltage ratings and insulation levels^a

Rated maximum voltage (kV rms)	Insulation levels		
	Power frequency withstand (kV rms)		Lightning impulse withstand (kV peak)
	Dry (1 min)	Dew ^b (10 s)	
1.058	3.0	—	—
4.76	19	15	60
8.25	36	24	95
15	36	24	95
15.5	50	50	110
27	60	60	125
38	80	70	150

^a For field test values, see 6.4.3.

^b Dew tests are not required when condensation control is utilized as required for the specified application conditions, or when insulators used have been previously qualified in accordance with ANSI C29.1 dew tests. When required, dew withstand voltage tests shall be made in accordance with ANSI C29.1.

Table 3—Segregated-phase bus—preferred voltage ratings and insulation levels^a

Rated maximum voltage (kV rms)	Insulation levels		
	Power frequency withstand (kV rms)		Lightning impulse withstand (kV peak)
	Dry (1 min)	Dew ^b (10 s)	
15.5	50	50	110
27	60	60	125
38	80	70	150

^a For field test values, see 6.4.3.

^b Dew tests are not required when condensation control is utilized as required for the specified application conditions, or when insulators used have been previously qualified in accordance with ANSI C29.1 dew tests. When required, dew withstand voltage tests shall be made in accordance with ANSI C29.1.

Table 4—DC ME bus—preferred voltage ratings and insulation levels^a

Rated maximum voltage (V dc average)	Insulation levels	
	DC withstand dry ^b (kV)	Power frequency withstand (kV rms)
300 / 325	3.1	2.2
800	5.2	3.7
1200	6.8	4.8
1600	7.6	5.4
3200	12.4	8.8

^a For field test values, see 6.4.3.

^b The presence of “dc withstand dry” does not imply any requirement for a dc withstand test on either ac or dc equipment. This column is given as a reference only for those using dc tests and represents values believed to be appropriate and approximately equivalent to the corresponding ac power frequency withstand test values specified for each class of ME bus. Because of the variable voltage distribution encountered when making dc withstand tests and variances in leakage currents associated with various insulation systems, the manufacturer shall be contacted for recommendations before applying dc withstand tests to this equipment.

5.3 Rated power frequency

The rated power frequency of ME bus is the frequency of the circuit for which it is designed. All ac ratings in this standard are based on a rated power frequency of 50 Hz to 60 Hz.

5.4 Rated current

5.4.1 Rated continuous current

The rated continuous current of ME bus is the maximum current in rms amperes (for ac ME bus) at rated power frequency or dc amperes (for dc ME bus), which can be carried continuously by the primary circuit components, including buses and connections, without causing temperatures or temperature rises in excess of specified limits for the following:

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

The specified temperature and temperature rise limits applicable to ME bus are given in Table 5 and Table 6. The continuous self-cooled current ratings of ME bus are listed in Table 7 and Table 8.

Table 5—Temperature limits for ME bus

Part of ME bus	Limit of hottest-spot temperature rise (°C)	Limit of hottest-spot total temperature (°C)
Bus conductor		
a) Unplated bus joint	30	70
b) Tin- or silver-surfaced (or equivalent) bolted joints	65 ^b	105 ^b
c) Welded joints	65	105
Enclosures and support structure^a		
a) For bus conductor rated 65 °C rise	40	80
b) For bus conductor rated 30 °C rise	20	60
Insulation	As limited by material classification (see Table 6)	—
Terminations	Same as conductor and enclosure of bus except when modified by connected equipment bushing. In such cases, maximum temperature rise is to be specified by bus purchaser.	
Connections to insulated cables		
a) Unplated bolted joints	30	70
b) Tin- or silver-surfaced (or equivalent) bolted joints	45	85

^aWhere enclosure and support structure are inaccessible to an operator in the normal course of his duties, 70 °C rise and 110 °C total temperature are permissible

^b Unless limited by insulation

Table 6—Temperature limits for insulating materials^a

Class of insulating material	Limit of hottest-spot temperature rise (°C)	Limit of hottest-spot total temperature (°C)
Class 90	50	90
Class 105	65	105
Class 130	90	130
Class 155	115	155
Class 180	140	180
Class 220	180	220
NOTE—For additional information on temperature limits, see IEEE Std 1™ [B7].		

^aThese temperature limits for insulating materials may not apply to insulation in circuit breakers or other devices. For temperature limits on devices, refer to the appropriate standards for the devices.

Table 7—Isolated-phase bus—preferred continuous self-cooled current ratings (rms amperes)

Current ratings		
1200	7000	16 000
2000	8000	18 000
3000	9000	20 000
4000	10 000	22 000
5000	12 000	24 000
6000	14 000	—

Table 8—Segregated-phase, nonsegregated-phase and cable bus—preferred continuous self-cooled current ratings (rms amperes)

1.058 ac ^a and all dc ^a	Rated maximum voltage (kV)				
	4.76 ^a	8.25 ^a and 15 ^a	15.5	27	38
600	—	—	—	—	—
1200	1200	1200	1200	1200	1200
1600	—	—	—	—	—
2000	2000	2000	2000	2000	2000
2500	—	—	2500	2500	2500
3000	3000	3000	3000	3000	3000
3200	—	—	3500	—	—
4000	4000	4000	4000	—	—
—	—	—	4500	—	—
5000	5000	5000	5000	—	—
—	—	—	5500	—	—
6000	6000	6000	6000	—	—
6300	—	—	—	—	—
8000	—	—	—	—	—
10000	—	—	—	—	—
12000	—	—	—	—	—
15000	—	—	—	—	—

^a This rating is not typically applicable to segregated phase bus.

Table 9—Isolated-phase bus—preferred continuous forced-cooled current ratings (rms amperes)

Current ratings		
10 000	20 000	30 000
12 000	22 000	35 000
14 000	24 000	40 000
15 000	26 000	45 000
18 000	28 000	50 000

5.4.2 Rated short-circuit withstand current

For segregated and nonsegregated-phase bus with a rated maximum voltage rated up to 1.058 kV ac, the rated short-circuit withstand current is the designated limit of available current that it shall be required to withstand under the prescribed test conditions. The peak current shall be the value, including the dc component, at the major peak of the maximum cycle as determined from the envelope of the current wave in the maximum offset phase during a test period of at least four power frequency cycles. The symmetrical current shall be the rated short-time current, and the peak current value shall be 2.3 times its rated short-time current at the major peak of the maximum cycle.

For dc ME bus, the rated short-circuit withstand current shall be the peak current that it shall be required to withstand when tested using a dc source for a test duration of at least 167 ms.

The rated short-circuit withstand current is also referred to as the rated peak withstand current.

Preferred ratings are given in tables Table 10 and Table 11.

5.4.3 Rated momentary withstand current

The rated momentary withstand current of ME bus with rated maximum voltage over 1.058 kV ac is the maximum peak current that it shall be required to withstand. The current shall be the peak value, including the dc component, at the major peak of the maximum cycle as determined from the envelope of the current wave of the maximum offset phase during a test period of at least 10 power frequency cycles. The symmetrical current shall be the rated short-time current and the peak current value shall be 2.6 times its rated short-time current at the major peak of the maximum cycle.

For ME bus connected to switchgear assemblies that include only generator circuit breakers (and no other switching devices) complying with IEEE/IEC Std 62271-37-013 [B20], the peak current value shall be 2.74 times the rated short-time current.

The rated momentary withstand current is also referred to as the rated peak withstand current.

Preferred ratings are given in tables Table 10 and Table 11.

5.4.4 Rated short-time withstand current

The rated short-time withstand current of ME bus with a rated maximum voltage up to 1.058 kV ac is the designated limit of available (prospective) current at which it shall be required to withstand its short-time current duty cycle (two periods of 0.5 s current flow, separated by a 15 s interval of zero current) under the prescribed test conditions. At the manufacturer's option, the rating may be established with a single test duration of 1 s.

The rated short-time withstand current of segregated- and non-segregated phase bus with a rated maximum voltage greater than 1.058 kV ac is the average rms symmetrical current that it shall carry for a period of 2 s.

The rated short-time withstand current of isolated-phase bus is the average rms symmetrical current that it can carry for a period of 1 s.

The test current for all ac ME bus shall continue for the specified time duration (0.5 s, 1 s, or 2 s, as applicable), and the alternating component of the current shall remain constant. If the ac component of the test current does not remain constant for the test duration, the value of the average symmetrical current squared times the actual duration of the test shall be no less than I^2 times the rated short-time duration ($0.5 \times I^2$ or $1.0 \times I^2$ or $2.0 \times I^2$, as applicable). If necessary, the test duration may be extended to not more than 125% of the specified time to achieve the required value of I^2t .

The rated short-time withstand current of dc ME bus is the designated limit of available (prospective) sustained rms or dc current that it shall be capable of carrying for not less than 250 ms.

The *short-time current withstand rating and the momentary current withstand rating for isolated-phase bus* shall be as required by the equipment to which the *isolated-phase bus* is connected.

Preferred ratings are given in Table 10 and Table 11.

**Table 10—Segregated phase, nonsegregated phase, and cable bus—
preferred rated withstand currents**

Rated maximum voltage (kV rms)	Rated short-time withstand current (kA rms symmetrical)	Rated short-circuit withstand current (for ME bus rated up to 1.058 kV ac) or momentary withstand current (for ME bus rated over 1.058 kV ac) ^a	
		(kA rms asymmetrical)	(kA peak)
1.058	22.0	29	51
	42.0	56	97
	65.0	86	150
	85.0	113	196
4.76	31.5	49	82
	40.0	62	104
	50.0	78	130
	63.0	98	164
8.25	40.0	62	104
15	20.0	31	52
	25.0	39	65
	31.5	49	82
	40.0	62	104
	50.0	78	130
	63.0	98	164
15.5	20.0	31	52
	31.5	49	82
	40.0	62	104