UL 857

STANDARD FOR SAFETY

Busways

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UL Standard for Safety for Busways, UL 857

Thirteenth Edition, Dated March 25, 2009

Summary of Topics

This revision of ANSI/UL 857 dated April 9, 2021 is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS). No technical changes have been made.

As noted in the Commitment for Amendments statement located on the back side of the title page, UL, CSA, and ANCE are committed to updating this harmonized standard jointly. However, the revision pages dated April 9, 2021 will not be jointly issued by UL, CSA, and ANCE as these revision pages only address UL ANSI approval dates.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The requirements are substantially in accordance with Proposal(s) on this subject dated January 8, 2021.

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This ANSI/UL Standard for Safety consists of the Thirteenth Edition including revisions through April 9, 2021. The most recent designation of ANSI/UL 857 as a Reaffirmed American National Standard (ANS) occurred on April 9, 2021. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface.

The Department of Defense (DoD) has adopted UL 857 on April 20, 1993. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

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Annex E (Informative) French Translations and Markings

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Preface

This is the harmonized ANCE, CSA, and UL standard for Busways. It is the third edition of NMX-J-148-ANCE, the sixth edition of CSA C22.2 No. 27, and the thirteenth edition of UL 857. This edition of CSA C22.2 No. 27 supersedes the previous edition published in 2000. This harmonized standard has been jointly revised on December 9, 2011. For this purpose, CSA and UL are issuing revision pages dated December 9, 2011, and ANCE is issuing a new edition dated December 9, 2011.

This harmonized standard was prepared by the Association of Standardization and Certification (ANCE), the Canadian Standards Association (CSA), and Underwriters Laboratories Inc., (UL). The efforts and support of the CANENA Busway Technical Harmonization Committee are gratefully acknowledged.

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard.

The present Mexican Standard was developed by the CT CDI from the Comite de Normalizacion de la Asociacion de Normalizacion y Certificacion, A. C., CONANCE, with the collaboration of the busway manufacturers and users.

This standard was reviewed by the CSA Subcommittee on Busways, under the jurisdiction of the CSA Technical Committee on Industrial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee.

This standard has been approved by the American National Standards Institute (ANSI) as an American National Standard.

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

Level of harmonization

This standard uses the IEC format but is not based on, nor is it considered equivalent to, an IEC standard.

This standard is published as an equivalent standard for ANCE, CSA, and UL. An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical national differences are allowed for codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

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Busways

1 Scope

1.1 Scope and object

1.1.1 This Standard applies to service-entrance, feeder, and branch-circuit busways and associated fittings rated at 600 V or less, 6 000 A or less, and intended for use in accordance with the Canadian Electrical Code, Part I (CE Code, Part I), the National Electrical Code (NEC), NFPA 70, and the Mexican Standard for Electrical Installations (Utility), NOM-001-SEDE, (see Annex B, Reference Item No. 1). These requirements do not apply to metal enclosed bus intended for connecting switchgear assemblies for use in prefabricated electric distribution systems.

1.1.2 For the purpose of these requirements, a busway is considered to be a grounded metal enclosure containing factory mounted conductors that are usually copper or aluminum bars, rods, or tubes.

1.1.3 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

1.1.4 Unless otherwise indicated, all voltage and current values mentioned in this Standard are root-mean-square (rms).

1.2 Reference publications

1.2.1 Products covered by this standard shall comply with the reference installation codes and standards as appropriate for the country where the product is to be used. When the product is intended for use in more than one country, the product shall comply with the installation codes and standards for all countries where it is intended to be used. See Annex B for a list of reference publications.

1.2.2 For undated references to standards, such reference shall be considered to refer to the latest edition and all revisions to that edition up to the time when this standard was approved. For dated references to standards, such reference shall be considered to refer to the dated edition and all revisions published to that edition up to the time when this standard was approved.

1.2.3 In Canada, general requirements are as indicated in Reference Item No. 21, Annex B and Grounding and Bonding requirements are as indicated in Reference Item No. 22, Annex B.

1.3 Components

1.3.1 Except as indicated in Clause 1.3.2, a component of a product covered by this Standard shall comply with the requirements for that component. See Annex A for a list of Standards covering components generally used in the products covered by this Standard. A component shall comply with the ANCE, or the Canadian Standards Association, or the Underwriters Laboratories Inc. standards, as appropriate, for the country where the product is to be used.

1.3.2 A component is not required to comply with a specific requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or

b) Is superseded by a requirement in this standard.

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1.3.3 A component shall be used in accordance with its rating established for the intended use.

1.3.4 Specific components that are incomplete in construction features or restricted in performance capabilities are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions for which they have been investigated.

1.4 Fittings

1.4.1 A trolley (busway fitting) shall comply with the clauses of this Standard listed in Annex D, Table D.1.

1.4.2 A fitting shall comply with the clauses listed in Annex D, Table D.2.

1.4.3 An outdoor fitting shall comply with the clauses listed in Annex D, Table D.2 and Table D.3.

1.5 Short-run busway

1.5.1 Short-run busway need only comply with those requirements specifically stating their application to short-run busway.

1.6 Insulating materials

1.6.1 Insulating material, other than wire insulation, tape, thermoplastic tubing, or continuous bus bar insulation, relied upon for over-surface spacing shall be resistant to arc-tracking under wet contaminated surface conditions and shall be:

a) A ceramic-type material or

b) A material having a Comparative Tracking Index (CTI) no less than 175 as determined in accordance with Reference Item No. 15, Annex B.

1.6.2 Insulating tape used in an outdoor ventilated busway shall be marked "Weather Resistant" under the conditions described in Reference Item No. 14, Annex B.

1.6.3 Requirements stated throughout this Standard for fittings apply to tap boxes, feed boxes, plug-in devices, and similar fittings; but do not apply to busway elbows, tees, and crosses.

2 Definitions

2.1 General

Reserved for future use.

2.2 Constructional units of assemblies

Reserved for future use.

2.3 External design of assemblies

2.3.1 Open-type assembly

Reserved for future use.

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2.3.2 Dead-front assembly

Reserved for future use.

2.3.3 Enclosed assembly

Reserved for future use.

2.3.4 Busbar trunking system (busways)

2.3.4.1 Short-run busways

2.3.4.1.1 Short-run busways are unventilated busways intended:

a) Primarily to feed switchboards;

b) To have no intermediate taps (except for transformer stubs); and

c) For a maximum horizontal run of 9.14 m (30 ft) or a maximum vertical run of 3.05 m (10 ft).

2.3.4.1.2 Short-run busways include only straight lengths, elbows, fittings, and transformer taps (not necessarily end of run). A short-run busway is intended for horizontal runs, but one leg of any elbow may be installed in a vertical position.

2.3.4.2 Trolley busway

2.3.4.2.1 A trolley busway has provision for continuous contact with a trolley by means of a slot in the enclosure. Because the slot must accommodate a moveable trolley, the acceptable degree of exposure of uninsulated live parts in a trolley busway is necessarily larger than in a busway of another type.

2.3.4.3 Continuous plug-in busway

2.3.4.3.1 In Canada and Mexico, a continuous plug-in busway is rated at 400 A or less, has no exposed bus bars, and is intended for general use, including installation within the reach of persons. In the United States, a continuous plug-in busway is rated at 225 A or less.

2.3.4.4 Lighting plug-in busway

2.3.4.4.1 A lighting plug-in busway is rated at 50 A or less and is intended to provide:

a) Means for the support of luminaires [fluorescent, incandescent, or high-intensity discharge (HID)] and

b) Means by which the fixtures may be plugged into the power supply.

Note: In Canada the rating of the plug-in lighting busway is limited to values below 50 A by lighting branch circuit overcurrent protection requirements of the CEC, Part I.

2.4 Structural parts of assemblies

Reserved for future use.

2.5 Conditions of installation of assemblies

Reserved for future use.

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2.6 Protective measures with regard to electric shock

Reserved for future use.

2.7 Gangways within an assembly

Reserved for future use.

2.8 Electronic functions

Reserved for future use.

2.9 Insulation co-ordination

Reserved for future use.

2.10 Short-circuit currents

Reserved for future use.

3 Classification of assemblies

Reserved for future use.

4 Electrical characteristics of assemblies

4.1 General

A busway or fitting shall be rated in amperes, volts, and in short-circuit current. A short-run busway shall be rated in accordance with Clause 7.5.2.2.1.

The ampere and voltage rating of an elbow, cross, or tee shall be identical with that of the busway with which it is intended for use.

A busway fitting incorporating a current-interrupting device shall be rated in accordance with the requirements for such an interrupting device.

A busway fitting that may be used for housing a circuit breaker of any of several different ratings may carry a voltage rating and a current rating equal to the maximum of such different ratings if the enclosure is marked in accordance with Clause 5.2.10.

4.2 Rated voltages

4.2.1 The voltage rating for a busway or fitting shall be 600 V or less.

4.3 Rated current (of a circuit of an assembly)

4.3.1 A busway may have a single- or a dual-current rating, exclusive of a second rating to indicate a reduced ampacity of a neutral. A single-current rating is a rating that applies to the busway when it is mounted in any position, unless the busway is marked in accordance with Clause 5.2.17.6. If a busway has a certain ampere rating when mounted in any position and, in addition, is rated for a higher ampere

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rating when mounted in one particular position, both the lower and higher ampere values may be included as a dual-current rating, provided the busway is marked in accordance with Clause 5.2.10.

4.3.2 If a busway is for use on direct current only, the rating shall include such information.

4.3.3 If the ampacity of a neutral bus bar is less than that of the other bus bars, the rating shall include such information.

4.4 Rated short-time withstand current (I_{cw}) (of a circuit of an assembly)

Reserved for future use.

4.5 Rated peak withstand current (I_{pk}) (of a circuit of an assembly)

Reserved for future use.

4.6 Rated conditional short-circuit current (I_{cc}) (of a circuit of an assembly)

4.6.1 The short-circuit current rating of a busway or fitting shall be one or more of the values shown in Table 1.

Table 1
Short-circuit current ratings

RMS symmetrical or DC amperes		
5 000	25 000	75 000
7 500	30 000	85 000
10 000	35 000	100 000
14 000	42 000	125 000
18 000	50 000	150 000
22 000	65 000	200 000

4.7 Rated fused short-circuit current (I_{cf}) (of a circuit of an assembly)

Reserved for future use.

4.8 Rated diversity factor

Reserved for future use.

4.9 Rated frequency

Reserved for future use.

5 Information to be given regarding the assembly

5.1 General

A required marking shall be molded, die-stamped, paint-stenciled, stamped, or etched metal that is permanently secured or indelibly applied lettering on a label secured by adhesive or glue. Ordinary usage, including likely exposure to weather and other ambient conditions, handling, storage, and the like, of the

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equipment shall be considered in the determination of the acceptability of the application. The need for exposure tests on forms of marking other than labels shall be individually investigated. After being subjected to the tests specified in Table 2, the sample shall rest, dry, or cool as applicable for the period of time specified for the test involved. Subsequently, the labels shall show no separation from the test surface except at the corners or edges. The total area of separation of the corners or edges shall not exceed 10 percent of the label area. The marking shall be legible.

For the purpose of the aging test conducted as part of the exposure conditions required in Reference Item No. 18, Annex B, rated surface temperatures shall be as specified in Table 3.

Other temperatures than those specified in Table 3 may be used for the purposes of the aging test if it can be demonstrated that the temperature will not be exceeded in service.

Table 2
Label test criteria

Enclosure type	Inside the enclosure	Outside the enclosure
Indoor	A	A
Outdoor	B	C

NOTES

1 Applies to nonmetallic labels and labels secured by adhesive.

2 The requirement and qualification tests from Reference Item 18, Annex B, are as follows:

a) Exposure conditions for labels intended only for indoor dry locations.

b) Exposure conditions for labels for use indoors where exposed to high humidity or occasional exposure to water.

c) Exposure conditions for labels intended for both indoor or outdoor use where exposed to high humidity or occasionally exposed to water.

Table 3
Rated surface temperatures

Temperature type	Indoor use, °C	Outdoor use, °C
High	60	80
Low	0	minus 35

A cautionary marking shall be located on a part:

a) That would require tools for removal or

b) That cannot be removed without impairing the operation of the product.

***Advisory Note**: In Canada, there are two official languages, English and French. Annex E provides French translations of the markings specified in this standard. Markings required by this standard will in some cases have to be provided in other languages to conform with the language requirements of the country where the product is to be used.*

5.2 Nameplates

5.2.1 Each length of a short-run busway and each fitting shall be marked with the manufacturer's name or trademark, the electrical ratings (rated voltage and current), and the number of poles and may also be

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marked for outdoor use. The short-circuit current rating markings shall be in accordance with Clauses 5.2.13 and 5.2.15.

5.2.2 Each length of busway and each fitting, elbow, or tee shall be legibly and permanently marked, where readily visible after installation, with:

a) The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified;

b) The electrical ratings (rated voltage, current, and short circuit current); and

c) The number of poles (bus bars not at the same potential during normal use).

5.2.3 Each fitting, such as a switch or circuit breaker, shall be legibly and permanently marked, where readily visible after installation, with:

a) The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified;

b) The catalog number, identification number, or the equivalent; and

c) The electrical ratings (rated voltage, current, and short-circuit current).

5.2.3.1 Fittings incorporating luminaires and evaluated for use on lighting busways and/or continuous plug-in busways shall additionally be marked to indicate the busway(s) with which the fitting is intended to be used.

5.2.4 The markings specified in Clauses 5.2.2 and 5.2.3 shall be on a nonremovable part and shall be readily visible after the busway system has been installed in the intended manner.

5.2.4.1 For fittings incorporating luminaries and evaluated for use on lighting busways and/or continuous plug-in busways, the markings specified in Clauses 5.2.2, 5.2.3, and 5.2.3.1 shall be visible during the installation of the fitting.

5.2.5 If a manufacturer produces or assembles busways and fittings at more than one factory, each finished length of busway and each finished fitting shall have a distinctive marking, which may be in code, by which it can be identified as the product of a particular factory.

5.2.6 A busway intended for use with a trolley shall be marked: "Trolley busway."

5.2.7 A lighting busway shall be marked with the words: "Lighting busway."

5.2.8 A continuous plug-in busway shall be marked with the words: "Continuous plug-in busway."

5.2.9 If a busway fitting has provision for one or more watthour meters, the current rating of the meter position shall be marked on the fitting. If the meter position is rated for continuous duty, the marking shall be: "____A Continuous (or equivalent)." If the meter position is rated for a maximum rating, the marking shall be: "____A (or equivalent) (____Amp Continuous (or equivalent))," in which case the maximum amperes shall be no more than 125 percent of the continuous-duty amperes.

5.2.10 A busway fitting containing a circuit breaker marked with a maximum rating as described in Electrical characteristics of assemblies, General, Clause 4.1, shall also be marked with instructions for determining the rating of the breaker actually installed therein, unless the breaker rating equals the maximum rating.

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5.2.11 A busway having a dual-current rating, other than a dual rating resulting from a reduced neutral capacity as described in Clause 4.3.1, shall be marked, in association with the larger rating, with instructions concerning the position in which the busway must be mounted for such rating.

5.2.12 A busway shall be marked with the ampere rating of the overcurrent protective device to be used on the line side of the busway if the cross-sectional area of the ground bus or enclosure material is sized in accordance with Table 13.

5.2.13 A busway or fitting shall be marked with the following:

a) The phrase: "Short circuit current rating," and the short-circuit current rating in dc or rms symmetrical amperes as noted in Table 1. A busway fitting that has no external load circuit leaving the enclosure, such as a ground detector or the like, need not be marked with a short-circuit rating.

b) The maximum voltage rating for each short circuit current rating.

c) A phrase indicating that the short-circuit rating is limited to the lowest short-circuit rating of any busway or fitting installed (the phrase is not required if all such busways and fittings that are intended for installation have identical short-circuit current ratings).

d) In the case of a busway fitting containing a circuit breaker, a phrase indicating that a replacement shall be of the same manufacturer, type designation, short-circuit rating, and ampere rating, where applicable.

e) In the case of a busway fitting containing fuseholders rated over 10 000 A, a phrase: "Use Class (G, J, L, RK1, RK5, or T) fuses." The marking need not mention the class of fuse if the short-circuit rating of the busway is 10 000 rms symmetrical amperes or less.

f) Instructions for lashing, securing, or bracing of field-installed conductors in the case of a busway or fitting having provision for cable connections unless instructions for lashing, securing, or bracing field installed conductors are not necessary if the short-circuit test represented the worst case of unsupported conductors.

5.2.14 If the short-circuit current rating of a busway is dependent upon the use of a specific overcurrent device ahead of the busway, the busway shall be marked: "When protected by ____ ampere maximum Class ____ fuse or Type ____ circuit breaker rated not more than ____ amperes this busway is rated for use on a circuit capable of delivering not more than ____ RMS symmetrical amperes ____ volts maximum." The second blank space shall be filled with the fuse designation (G, J, L, RK1, RK5, or T). The third blank space shall be filled with the name of the circuit breaker manufacturer and the type designation. The value of amperes shall correspond to the symmetrical values given in Table 1.

5.2.15 If there is more than one short-circuit rating, all such ratings shall appear together. The markings shall be an integral part of the manufacturer's marking that contains the manufacturer's name or trademark and the electrical rating, unless it is an integral part of other appropriate marking of the busway or fitting.

5.2.16 Each length of busway and each fitting intended for outdoor use shall be plainly marked to indicate that fact and, if drain holes are provided, shall be marked: "Install with drain holes down," or with other wording to clearly indicate the mounting position necessary to provide adequate drainage.

5.2.17 Mounting or hanging information

5.2.17.1 The short-run busway marking specified in Clause 5.2.1 shall include the statement: "Total connected length not to exceed 9.14 m (30 ft)." The leg of a short-run elbow intended for installation in a vertical position shall be marked: "This leg may be installed as part of a straight vertical run not more than 3.05 m (10 ft) long." The marking shall include instructions to space mounting supports at intervals of no more than 1.52 m (5 ft).

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5.2.17.2 Each length of busway intended for use in a vertical run shall be plainly marked to indicate that fact.

5.2.17.3 The intended mounting position of each length of busway shall be plainly marked on a busway that is not rated for both edgewise and flatwise mounting in a horizontal run.

5.2.17.4 The unsuitability for mounting in one or more of the positions shall be marked because of the inadequacy of enclosure strength, lack of ampacity, or other deficiency when mounted in that position.

5.2.17.5 Each length of either horizontal or vertical busway that is intended to be supported at intervals of more than 1.52 m (5 ft) shall be plainly marked to indicate the maximum support interval with which the busway can be used. If the support interval for vertical mounting exceeds the support interval for horizontal mounting, the marking shall clearly indicate that the higher support interval applies only when the busway is mounted vertically.

5.2.17.6 A busway having a single current rating shall be marked to indicate the intended mounting position, unless the busway has been investigated and determined acceptable for such rating when mounted in any position.

5.2.17.7 If a marking regarding the mounting or support of busway is required, that marking shall appear on or immediately adjacent to the nameplate that bears the marking required in Clause 5.2.17.6.

5.2.18 Service equipment information

5.2.18.1 A busway fitting that is intended for use as service equipment and that complies with Clause 7.1.1.31 shall be marked "Suitable for use as service equipment."

5.2.18.2 The marking shall be an integral part of the manufacturer's marking containing the manufacturer's name or trademark and the electrical rating, unless it is an integral part of another required marking of the fitting.

5.2.18.3 The marking shall be plainly visible after installation without requiring the opening of a door or cover, or the removal of a dead front or trim.

Other markings:

a) Shall not be located within 3.2 mm (1/8 in) of the marking described in Clause 5.2.18.1 and markings within 12.7 mm (1/2 in) of such marking shall be of less height or

b) Shall be in contrasting color or located in a distinctively separated area.

5.2.18.4 The characters in the markings shall be no less than 2.4 mm (3/32 in) high.

5.2.18.5 If a busway fitting is marked "Suitable only for use as service equipment," each service disconnecting means shall be marked "Service disconnect." The service disconnect marking identifying the service disconnecting switches or circuit breakers shall appear on or adjacent to the switch or circuit breaker handles.

5.2.18.6 If a busway fitting is marked "Suitable for use as service equipment," the service disconnect marking shall be provided in the form of pressure-sensitive markings in an envelope, or on a card, with instructions to apply near the disconnect handles if the equipment is used as service equipment.

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5.2.19 Miscellaneous information

5.2.19.1 If a busway or fitting includes a transverse barrier or divider, as covered in Clause 7.1.1.8, there shall be a marking on the outside of the busway or fitting to indicate this fact.

5.2.19.2 A plug-in circuit breaker housing shipped separately from the circuit breaker or the neutral, as described in Clause 7.1.1.39, shall be marked:

a) To indicate the neutral, the circuit breaker, or both, for which it is intended. If the circuit breaker is omitted, the marking shall give the name of the manufacturer of the circuit breaker, the type or catalog designation of the breaker, and the number of poles.

b) With its maximum voltage and ampere rating and shall make reference to the rating of the circuit breaker that will be installed in it; for example, the fitting may be marked "See ampere rating on breaker handle." The marking, including the ampere rating of the breaker, may be located on the inside of a door or cover, provided that the door may be opened or the cover removed, regardless of the position of the breaker handle.

5.2.19.3 If, in accordance with Clause 7.1.1.39, a neutral assembly is shipped from the factory separately from the plug-in switch with which it is intended to be used:

a) The neutral assembly shall be marked with its own catalog number or the equivalent and with the name or trademark of the manufacturer and

b) The switch shall be marked with the catalog number or the equivalent for the neutral assembly and with an indication of the voltage ratings for which the neutral assembly must be used.

5.2.19.4 The on and off positions of the mechanism of a switching take-off device fitting shall be externally marked.

5.2.19.5 If a circuit breaker handle or a simple extension of that handle has an additional or intermediate position that it takes upon automatic tripping, that position and the resetting instructions for the breaker shall be described in the marking. Marking to indicate the tripped position shall not be required in the case of a separate, external operating handle, other than a simple handle extension, that is not part of the circuit breaker. Such a handle may remain in the on position.

5.2.19.6 A busway fitting containing a circuit breaker or a fused disconnect switch shall be marked "Line" and "Load" unless investigated for reverse line and load connection. The line and load markings may be located on a wiring diagram attached to the inside of the enclosure if the diagram indicates clearly the proper connections.

5.2.19.7 A nonswitched plug-in device that has not been found by test to comply with the requirements in Clauses 8.2.8.1 – 8.2.8.3 shall be marked "Do not remove under load."

5.2.20 Wire, wire connectors, and wire torque information

5.2.20.1 If a pressure terminal connector is not provided on the equipment as shipped, the equipment shall be marked stating which pressure terminal connector or component terminal assembly is rated for use with the equipment. The terminal assembly package shall carry an identifying marking, wire size, and the manufacturer's name or trademark.

5.2.20.2 Wire connectors of the type mentioned in the marking may be installed on the equipment at the factory with instructions, if necessary, to effect proper connection of the conductors.

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5.2.20.3 If any terminal of a busway or fitting is marked to indicate that aluminum wire may be used at that terminal (such as being marked with the symbol "AL") and if such marking is visible under the conditions described in Clause 5.2.20.4, the busway or fitting shall be marked in accordance with Clause 5.2.20.4 and Clause 5.2.20.5 or 5.2.20.18, whichever applies.

5.2.20.4 The term "visible" refers to a marking that will be visible when a cover has been removed or is visible when a hinged cover of a component has been opened. A marking on a separately supplied connector or on a connector or part thereof that is likely to be removed or displaced during the wiring operation is considered to be visible.

5.2.20.5 If, because of wiring space or other factors, no terminal of a busway or fitting is acceptable for use with aluminum wire, the busway or fitting shall be marked "Use copper wire only."

5.2.20.6 If the wiring space and other factors are such that all terminals of a busway or fitting are acceptable for use with aluminum wire as well as with copper wire, the busway or fitting shall be marked "Use copper or aluminum wire."

5.2.20.7 If a field-installed overcurrent device is available, with markings to indicate that the terminals are acceptable for use with aluminum wires, the marking in Clause 5.2.20.6 shall be used only if:

a) The neutral terminals are rated for use with aluminum wire.

b) The marking includes a statement that the field-installed unit must carry the marking indicating acceptability for use with aluminum wire.

5.2.20.8 If the wiring space and other factors are such that some terminals of a busway or fitting are rated for use with aluminum wire as well as with copper wire, while the remainder of the terminals are rated for use with copper wire only, the busway or fitting shall be marked "Use copper wire only except at terminals ____" or equivalent. The marking shall positively identify the terminals that are rated for use with aluminum wire.

5.2.20.9 The word "terminal" as used in Clauses 5.2.20.3 and 5.2.20.5 – 5.2.20.8 signifies any terminal of a busway or fitting as well as a terminal of any component unit (circuit breaker, switch, or the like) that is installed or intended to be installed in the busway or fitting and to which wires are to be connected in the field.

5.2.20.10 Marking provided in accordance with Clauses 5.2.20.5 and 5.2.20.6 or Clause 5.2.20.8 shall be readily and clearly visible after installation with any cover or trim removed.

5.2.20.11 Only the words that are specified in Clauses 5.2.20.5 and 5.2.20.6 shall be used when these markings are provided, and any abbreviation used to designate copper and aluminum shall be "Cu-Al" or "Al-Cu."

5.2.20.12 The characters in the markings described in Clauses 5.2.20.5 – 5.2.20.8 shall be no less than 2.4 mm (3/32 in) high.

5.2.20.13 If a wire terminal is rated for securing more than one conductor in an opening and is intended for such use, a marking indicating the number of conductors shall be provided. The marking shall be on the wire connector, if visible, or in another visible location, such as next to the terminal or on a wiring diagram.

5.2.20.14 If a pressure terminal connector provided in the busway or fitting or in a terminal assembly described in Clause 7.8.3.2 (d) for a field-installed conductor requires the use of a particular tool for securing the conductor, any necessary instructions for using the tool shall be provided. The instructions

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shall be included in a readily visible location, such as on the connector, on a wiring diagram, or a tag secured to the connector. The instructions may consist of a reference to the tool if assembly instructions are on the tool.

5.2.20.15 A busway or busway fitting shall be marked to indicate the specific tightening torque for each wire connector in the busway or fitting that is intended for field wiring. If different connectors are used for line, load, neutral, or ground, the specific torques to be applied to each connector shall be clearly indicated. The value of tightening torque for a field wiring terminal provided on a component such as a circuit breaker, switch, or the like need not be marked on the busway or fitting.

5.2.20.16 The torque to be marked for each connector shall be determined as specified in Clause 7.8.3.7. An example of a typical torque marking is shown in Annex C.

5.2.20.17 A busway or busway fitting having terminals for field wiring shall be marked in a location readily visible prior to being wired to indicate the required temperature rating of each field installed conductor.

5.2.20.18 A busway fitting provided with circuit breakers rated 110 A or less or having any circuits rated 110 A or less shall be marked to indicate use of 60°C sized conductors only for circuits rated 110 A or less, and 75°C sized conductors for circuits rated more than 110 A unless:

a) The marking may specify 75°C sized conductors for a circuit rated 110 A or less if:

1) The circuit breakers involved are marked 75°C or 60/75°C;

2) The circuit breakers are spaced at least 76.2 mm (3 in) apart from all other circuit breakers; and

3) The circuit breakers are to be installed in the field, in which case a marking shall specify that circuit breakers marked 75°C or 60/75°C only are to be used.

b) With regard to (a)(2), the circuit breakers need not be spaced 76.2 mm (3 in) apart if the test, described in Clause 8.2.1 is conducted with acceptable results.

With regard to (a)(3), and Clause 7.8.3.10 (a)(3), a 100-A circuit breaker marked for use with 75° C aluminum wire need not be spaced apart from other circuit breakers or be subjected to a temperature test.

5.2.20.19 A busway fitting that is marked to indicate that only 60° C field-installed conductors are to be used shall not reference a field-installed circuit breaker that has been investigated for 75° C conductors only.

5.3 Markings

Reserved for future use.

5.4 Instructions for installation, operation, and maintenance

5.4.1 A plug-in busway and, with regard to Clause 7.4.8, a plug-in fitting intended for use with a busway that:

a) Involves a possible short-circuit condition during the installation or removal of the plug-in fitting or

b) Does not establish grounding continuity 3.2 mm (1/8 in) before contacting a live part

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shall be marked with the word "DANGER" and the following or equivalent wording: "Risk of electric shock or burn. Turn off power to busway before installing, removing, or working on this equipment." The wording shall be located on the front of the plug-in fitting so that it will be readily visible during any attempt to install or remove the fitting.

5.4.2 To provide for system performance testing as required, each ground fault relay or apparatus incorporating a ground fault relay or its functions intended for protection of a solidly grounded wye service rated more than 150 V to ground but not exceeding 600 V phase-to-phase shall be provided with information sheets describing system testing instructions, and with a test form. The form shall include a space for the date the test was performed and the results, and shall state that the form should be retained by those in charge of the building's electrical installation in order to be available to the authority having jurisdiction. The instruction shall include the following items and shall basically prescribe only that information necessary to perform the tests. The instructions shall be separate and apart from any more elaborate test detail that the manufacturer may wish to provide. The instructions shall specify that:

a) The interconnected system shall be evaluated in accordance with the busway manufacturer's detailed instructions, and that this evaluation shall be undertaken by qualified personnel.

b) The proper location of the sensors around the bus of the circuit to be protected shall be determined. This can be done visually, with knowledge of which bus is involved.

c) The grounding points of the system shall be verified to determine that ground paths do not exist that would bypass the sensors. The use of high-voltage testers and resistance bridges may be suggested.

d) The installed system shall be tested for correct response by the application of full scale current into the equipment to duplicate a ground fault condition, or by equivalent means such as by a simulated fault current generated by a coil around the sensors or a separate test winding in the sensors.

e) The results of the test shall be recorded on the test form provided with the instructions.

6 Service conditions

6.1 Normal service conditions

Reserved for future use.

6.2 Special service conditions

Reserved for future use.

6.3 Conditions during transport, storage, and erection

Reserved for future use.

7 Design and construction

7.1 Mechanical design

7.1.1 General

7.1.1.1 A busway and fitting shall employ only those materials that have been determined acceptable for the particular use. A busway system shall include all fittings necessary to make a complete installation.

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7.1.1.2 A busway system shall be constructed so that the busways and fittings, when properly interconnected, will constitute a complete mechanical assembly that provides electrical continuity.

7.1.1.3 Fastenings between parts of an enclosure shall be spot welds, continuous welds, machine- or self-threading screws engaging no less than two full threads, rivets, or other means. Screw fastenings that engage threads in nonmetallic materials shall be such that the threads will not be stripped by hand-tightening with the intended tool.

7.1.1.4 Sheet metal screws may be used for fastenings of a busway proper (but shall not be used for the enclosure of a plug-in device) if they are not intended to be subject to removal and replacement.

7.1.1.5 A surface of steel employed in an enclosure shall be made corrosion-resistant by painting, enameling, galvanizing, plating, or equivalent means.

7.1.1.6 A steel part, other than the enclosure, a screw, or other fastening part, shall have corrosion resistance equivalent to that required for the enclosure. A screw and any other steel fastening part shall be plated.

7.1.1.7 A busway, other than a short run-busway, shall be provided with means for support (not necessarily integral with the busway) at intervals of no more than 3.05 m (10 ft) for a horizontal run and no more than 4.88 m (16 ft) for a vertical run. If the intended interval between supports is more than 1.52 m (5 ft), the busway shall be subjected to the test described in Clause 8.2.7.1 and the verification of crushing resistance, Clause 8.2.7.3.1. A vertical busway with supports no more than 3.05 m (10 ft) apart need not be subjected to the verification of bending resistance.

7.1.1.8 A transverse barrier or divider that restricts the free flow of air may be included in a busway section, but this acceptance shall not imply the barrier is a fire stop. The busway shall be marked in accordance with Clause 5.2.19.1.

7.1.1.9 A busway intended for outdoor use and constructed to prevent the passage of water between adjoining sections shall be subjected to the performance requirements specified in Clauses 8.2.6.1 and 8.2.6.2.

7.1.1.10 A construction shall be investigated for preventing the flow of water past the barrier and for resistance to a temperature of minus 10° C. In a ventilated outdoor busway, the barrier shall also be investigated for resistance to the weather.

7.1.1.11 A bus bar support shall be of strong, moisture-resistant, insulating material having a thermal index of at least 105°C. The thermal index may be 85°C if the temperature rise during a heating test is in accordance with Table 12.

7.1.1.12 Porcelain, cold-molded composition, and phenolic composition are among the acceptable materials for bus bar supports. Butyl rubber having a thermal index of 90°C may be used as a combination bus bar covering and support if it complies with the requirements for aging, dielectric voltage-withstand, and impact specified in Clauses 8.2.2, 8.2.7.2 and 8.2.9 and if it is no less than 1.2 mm (3/64 in) thick at every point where it supports the bus bar.

7.1.1.13 For other than a short-run busway, the distance between centers of adjacent supports along the length of the bus bar shall be 762 mm (30 in) or less.

7.1.1.14 An insulating covering for a bus bar shall have a thermal index no less than 95°C. The thermal index of an insulating covering on an unplated copper bus bar in an indoor-type lighting or continuous plug-in busway rated no more than 60 A may be 60°C. An insulating covering may have a thermal index of

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85°C if the temperature rise during a heating test is in accordance with Table 12. See Annex B, Reference Item No. 16, for thermal index standards.

7.1.1.15 Varnished cloth is considered to have a thermal index of 85° C. A bus bar covering of thermoplastic splicing tape rated for general use at 80°C is considered to have a thermal index of 85°C if it complies with Clauses 8.2.9.2 and 8.2.9.3.1.

7.1.1.16 An insulating covering for a bus bar:

a) Shall be no less than 0.51 mm (0.020 in) thick;

b) May be less than 0.51 mm (0.020 in) thick but not less than 0.38 mm (0.015 in) thick if, upon investigation, the material:

1) Is determined to be acceptable for the application, considering such properties as ease of ignition, electrical resistance, dimensional stability, tensile strength, elongation, resistance to weathering, tear resistance, penetration, and abrasion; and

2) Withstands the application of a 5 000-V, 60-Hz test potential without breakdown. When conducting this test, the potential shall be brought up to the required value and held for one second. The potential shall be applied between the bus bar and metal foil wrapped around the covering, or

c) May be less than 0.38 mm (0.015 in) thick if the busway meets requirements (b)(1) and (b)(2) as stated above and is subjected to and successfully passes the mechanical and short-circuit tests in accordance with Clauses 8.2.3.1 and 8.2.7.

7.1.1.17 Thermoplastic tubing may be used as an insulating material for bus bars if all of the following conditions are met:

a) It is not subjected to compression, repeated flexure, or sharp bends.

b) All edges of the conductor covered with the tubing are rounded and free from sharp edges.

c) For chemically dilated tubing, a solvent recommended by the tubing manufacturer is used.

d) Its wall thickness (after assembly) is not less than 0.56 mm (0.022 in) for tubing 12.7 mm (1.2 in) or less in diameter, not less than 0.69 mm (0.027 in) for tubing 14.3 or 15.9 mm (9/16 or 5/8 in) in diameter, and not less than 0.71 mm (0.028 in) for larger tubing.

7.1.1.18 The acceptability of insulating materials used for bus bar covering, other than those specified in Clauses 7.1.1.12, 7.1.1.15, or 7.1.1.17, shall be determined in accordance with the requirements specified in Clause 7.1.2.3.1 and Table 9.

7.1.1.19 The enclosure of a ventilated busway shall have openings intended for ventilation or shall be formed from perforated sheet metal, expanded metal mesh, or the like.

7.1.1.20 In the case of an outdoor-use ventilated busway in which the ventilating openings constitute a major part of the area of the enclosure, consideration shall be given to the need for corrosion protection at the edges of the openings.

7.1.1.21 A bus bar covering in a ventilated busway shall provide protection against physical injury of the bus bar by a means equivalent to that provided by a wrap of varnished cambric tape.

7.1.1.22 A plug-in busway intended for the support of luminaires shall provide means for such support.

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7.1.1.23 A busway or fitting intended for outdoor use shall be subjected to the tests described in Clause 8.2.6. The test shall be conducted in any mounting position indicated by markings.

7.1.1.24 The enclosure of any busway or fitting marked for outdoor use shall be provided with holes to drain accumulated water.

7.1.1.25 A gasket or vapor seal that is relied upon for the exclusion of moisture or the free flow of air shall be of a material rated for the purpose and shall be resistant to aging.

7.1.1.26 A gasket of rubber or rubber-like material that is considered to be resistant to aging shall comply with Clause 8.2.12.

7.1.1.27 A meter-socket base shall be mounted independently of the cover unless it is intended to be used with a current transformer.

7.1.1.28 A meter-socket base shall be mounted in an enclosure that completely houses all live parts, with an appropriate meter mounted in position.

7.1.1.29 A bare live part on a meter-socket base shall be recessed as follows:

a) No less than 12.7 mm (1/2 in) behind the plane of the outer edge of the meter mounting rim, or behind the plane of the meter mounting hole if a mounting rim is not provided and

b) Behind the plane of the cover, unless a barrier or the like is provided so that the cover may be removed without the likelihood of it contacting a bare live part.

7.1.1.30 If a busway fitting has provision for a watt-hour meter not intended for use with current transformers, the rating of the meter position shall be no less than the rating of the circuit in which it is used.

7.1.1.31 A busway fitting marked for service equipment use shall comply with Reference Item No. 17, Annex B, as follows:

a) The line and grounding electrode conductor terminals shall be of the pressure wire connector type rated for a minimum wire size of 8 AWG (8.4 mm^2). Line terminals may be omitted as specified in Clause 7.8.1.

b) Equipment intended for alternating-current service shall have a pressure terminal connector for connection of a grounded service conductor. A pressure terminal connector for a grounding electrode conductor shall also be provided at the same connection point. If provisions for load connections are made or intended, the connection point (neutral) shall be insulated from the enclosure unless the equipment is marked "Suitable only for use as service equipment."

c) If the connection point described in (b) is not insulated from the enclosure, there shall be a bond to the equipment enclosure. If the connection point is insulated from the enclosure, provision for installing a main bonding jumper, consisting of a separate screw, strap, or other means, shall be provided to bond the enclosure to the connection point. The construction shall be such that when the bonding means is not used, at least the minimum acceptable spacings will exist. Unless the intended use and method of installation of the bonding means are obvious, instructions for its installation shall be provided.

d) A fitting shall be constructed so that:

1) All ungrounded load conductors can be disconnected from the source of supply and

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2) There is an overcurrent device (a fuse or circuit breaker) in series with each ungrounded service conductor.

e) Equipment marked for use as service equipment for 3-phase, 4-wire, wye-connected services rated in excess of 150 V to ground, but not exceeding 600 V phase-to-phase, shall be provided with ground fault protection, if rated 1 000 A or more, complying with Reference Item No. 17, Annex B.

f) Markings as specified in Clauses 5.2.18.1 – 5.2.18.4 shall be provided.

7.1.1.32 A busway fitting of the plug-in type shall not be marked for service equipment use if:

a) It is intended for use on the line side of the busway and

b) A live part would be exposed if the fitting could be disconnected from the busway with the switch or breaker in the on position.

7.1.1.33 Unless otherwise specified in this Standard, the enclosure of a busway fitting shall comply with the requirements in Reference Item No. 7, Annex B. The enclosure of a plug-in device not incorporating a switching mechanism may be of sheet steel having a thickness no less than 1.0 mm (0.042 in) if:

a) The device is rated at no more than 100 A;

b) The device is not intended for outdoor use;

c) Neither the length nor the width of the enclosure is more than 152 mm (6 in);

d) The area of the largest surface of the enclosure is no more than 155 cm^2 (24 in^2); and

e) The depth of the enclosure is no more than 76.2 mm (3 in).

7.1.1.34 A seam, joint, or splice at a corner or back edge of an enclosure of a fitting shall be closed and reinforced:

a) By a flange formed of the material from which the box is made;

b) By a separate flange; or

c) By other means, such as a continuous weld that provides a construction equivalent to an integral flanged construction.

7.1.1.35 The method of attachment of a plug-in device to the busway shall be such that:

a) After installation, there is no opening between the two enclosures larger than the size permitted in Clause 7.2.5 and

b) Positive metal-to-metal contact between the individual enclosures results unless the assembly complies with Clauses 8.2.4.3.1.1 and 8.2.4.3.3.1.

7.1.1.36 A busway plug-in device shall have provision for being secured to the busway in a manner that does not depend on friction alone.

7.1.1.37 A plug-in device not incorporating a switching mechanism shall require the use of a tool for removal from the busway and shall be marked in accordance with Clause 5.2.19.7 unless the plug-in device complies with the requirements in Clauses 8.2.8.1 – 8.2.8.3.

7.1.1.38 A fitting incorporating a disconnecting device (a switch or circuit breaker) with a separate, cover-mounted operating member shall be constructed so that the door, front, or cover cannot be secured in

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place as intended with the handle or operating member indicating "Off" and the disconnecting contacts in the closed position.

7.1.1.39 All live parts shall be mounted in place when a plug-in device is shipped from the factory. However, a busway plug intended for housing one or more circuit breakers may be shipped separately from the circuit breaker, the neutral bus, or both. The neutral bus of an enclosed switch plug-in device may be shipped separately from the remainder of the device if all of the following conditions are met:

a) The parts involved are constructed so that the method of field installation of the separate parts is obvious and does not require installation of auxiliary parts to accomplish the mounting or provide the required spacings.

b) The construction is such that the installation of the circuit breaker or the neutral is unnecessary either:

1) To maintain spacings involving the means for connecting the plug-in unit to the bus bars (the stabs and mounting means), or to prevent such parts from turning or shifting; or

2) To maintain spacings involving connecting leads or bus bars inside the plug-in device, unless such leads or bus bars are appropriately insulated.

c) The fitting is marked in accordance with Clause 5.2.19.3.

d) Instructions for installing the separate parts are provided.

7.1.1.40 Individual conductors (bus bars, wires, and the like) of an alternating-current circuit carrying more than 50 A shall not be run through separate openings in a ferrous metal wall.

7.1.1.41 A short-run busway shall be constructed so that electrical and mechanical continuity of the complete enclosure will result when the busway system is installed. The enclosure shall be of substantial construction and shall completely enclose the bus bars; the bus bars at an end fitting need not be enclosed. Openings for ventilation shall not be provided.

7.1.1.42 A short-run busway shall be provided with a ground bus located within the enclosure that complies with the requirements specified in Clause 7.4.1 without including the cross-sectional area of the enclosure.

7.1.1.43 A short-run busway enclosure shall be constructed of galvanized sheet steel, painted sheet aluminum, or other sheet steel provided with corrosion protection as specified in Clause 7.1.1.54. The thickness shall be in accordance with Table 4.

Table 4
Thickness of sheet metal for short-run busway

Maximum inside width,		Minimum thickness of sheet metal			
		Zinc coated steel,		Aluminum,	
mm	(in)	mm	(in)	mm	(in)
152	6	1.42	0.056	1.91	0.075
457	18	1.78	0.070	2.41	0.095
762	30	2.46	0.097	3.09	0.122

7.1.1.44 Each longitudinal seam of a short-run busway enclosure shall be provided with fastenings spaced no more than 305 mm (12 in) apart, as measured along the length of the duct.

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7.1.1.45 Four or more 6.4 mm (0.25 in) diameter drain holes shall be provided in each short-run busway section intended for outdoor use.

7.1.1.46 A short-run busway shall be provided with means for support at intervals of no more than 1.52 m (5 ft).

7.1.1.47 Short-run busway insulating supports for bus bars shall be spaced no more than 610 mm (24 in) apart, as measured between centers of adjacent supports along the length of the busway. An insulator shall be glazed porcelain, molded phenolic, sheet phenolic composition, or other insulating materials that have been investigated and determined to be rated for the purpose as described in Clauses 7.1.1.11 and 7.1.2.3.1.

7.1.1.48 An enclosure, an opening, a frame, a guard, a knob, a handle, or the like shall not be sufficiently sharp to constitute a risk of injury to persons during intended maintenance or use.

7.1.1.49 The enclosure shall contain all live parts and shall provide strength to maintain its shape when supporting a fitting intended for use with it. Every part shall be secured in place. A terminal to which an external connection will be made in a transformer tap or in a switchboard stub need not be enclosed.

7.1.1.50 An enclosure cover that prevents access to an overload protective device requiring renewal in its normal functioning shall be hinged, sliding, or otherwise attached to prevent its removal. To hold it closed, such a cover shall not depend solely upon screws or similar means requiring the use of a tool but shall be provided with a spring latch or catch. The requirement shall not apply to a plug-in device in which the enclosure is completed by the enclosure of the busway on which the device is mounted provided, the thickness of metal and the means of attaching the plug-in device are such that the resulting assembly is the equivalent of what would be required for the enclosure of the plug-in device itself.

7.1.1.51 Sheet metal employed for a busway enclosure shall have a thickness no less than that specified in Table 5 unless the busway complies with the requirements in Clauses 8.2.7.1.1.1, 8.2.7.2.1.1, and 8.2.7.3.1.1. Sheet metal employed for a fitting enclosure shall have a thickness in accordance with Clause 7.1.1.33. Sheet metal employed for a short-run busway shall have a thickness in accordance with Table 4.

A busway rated 100 A or less may employ an unventilated enclosure of sheet steel having a thickness of no less than 0.81 mm (0.032 in) and may employ a formed, unventilated enclosure of sheet steel no less than 0.66 mm (0.026 in) thick at any point if an insulating lining of vulcanized fiber, or the equivalent, no less 0.81 mm (0.032 in) thick is provided. The lining may serve as the sole separation between the bus bar and the enclosure.

Table 5
Thickness of sheet metal for busway other than short-run busway

Maximum inside width of widest surface,		Minimum thickness of sheet metal[a]			
		Steel,		Aluminum,	
mm	(in)	mm	(in)	mm	(in)
305[b]	12[b]	1.35	0.053	1.91	0.075
457	18	1.70	0.067	2.41	0.095
762	30	2.36	0.093	3.10	0.122
More than 762	More than 30	3.12	0.123	3.89	0.153

[a] The minimum thickness refers to the base material and does not include a coating thickness.

[b] The maximum width may be 457 mm (18 in) if the enclosure does not support the weight of the bus bar assembly.

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7.1.1.52 The thickness of sheet metal to which a wiring system is to be connected shall be no less than 1.35 mm (0.053 in) for steel, and no less than 1.91 mm (0.075 in) for aluminum, excluding any coatings.

7.1.1.53 An enclosure consisting of metal other than sheet steel or aluminum shall comply with the requirements in Clauses 8.2.7.1.1.1, 8.2.7.2.1.1, and 8.2.7.3.1.1.

7.1.1.54 An outdoor busway sheet steel enclosure shall be made corrosion resistant by one of the following coatings:

a) Hot-dipped, mill-galvanized sheet steel conforming with the coating designation G90 in Table 1 of Reference Item No. 4, Annex B, with no less than 40 percent of the zinc on any side, based on the minimum single-spot test requirement in the reference. The weight of zinc coating may be determined by any method deemed acceptable; however, in case of question, the weight of the coating shall be established in accordance with the test method in Reference Item No. 5, Annex B.

b) A zinc coating, other than that provided on hot-dipped, mill-galvanized sheet steel, uniformly applied to an average thickness of no less than 0.0155 mm (0.00061 in) on each surface with a minimum thickness of 0.0137 mm (0.00054 in). The thickness of the coating shall be established by the requirements in Clause 8.2.10.1.

c) A zinc coating conforming with (1) or (2) below and with one coat of an organic finish of the epoxy or alkyd-resin type or other outdoor paint on both surfaces after forming. If necessary, the acceptability of the paint may be determined by consideration of its composition or by corrosion tests. The paint may be omitted at the adjoining surfaces at joints between enclosure sections of a busway not having a ground bus.

1) Hot-dipped, mill-galvanized sheet steel conforming with the coating designation G60 or A60 in Table 1 of Reference Item No. 4, Annex B, with no less than 40 percent of the zinc on any side, based on the minimum single-spot test requirement in the reference. The weight of zinc coating may be determined by any method deemed acceptable; however, in case of question, the weight of coating shall be established in accordance with the test method of Reference Item No. 5, Annex B.

2) A zinc coating, other than that provided on hot-dipped, mill-galvanized sheet steel, uniformly applied to an average thickness of no less than 0.0104 mm (0.00041 in) on each surface with a minimum thickness 0.0086 mm (0.00034 in). The thickness of the coating shall be established by the requirements in Clause 8.2.10.1.

d) Other finishes, including paints, special metallic finishes and combinations of the two may be used if they comply with Reference Item No. 20, Annex B.

7.1.1.55 An annealed coating on sheet steel that is bent or similarly formed or extruded or rolled at edges of holes after annealing shall be additionally painted in the affected area if the process damages the zinc coating.

7.1.1.56 If flaking or cracking of the zinc coating at the outside radius of the bent or formed section is visible at 25 power magnification, the zinc coating shall be considered to be damaged. Simple sheared or cut edges and punched holes are not required to be additionally protected.

7.1.1.57 If the hot-dipped, mill-galvanized G90 coating on drawn, formed, extruded, or rolled sheet steel becomes damaged during handling or fabrication to the extent that the base metal is exposed, at least one coat of an organic finish of the epoxy or alkyd-resin type, or other outdoor paint, shall be applied after fabrication to the entire area where the damage to the coating occurred.

Exposed base metal of an uncoated cross-section surface at a cut edge or at a drilled opening is not required to be painted.

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