

Schneider Electric

iBusway for Data Center: Schneider Electric Powerbus Plug-In Busway

THIS GUIDE SPECIFICATION IS WRITTEN IN ACCORDANCE WITH THE CONSTRUCTION SPECIFICATIONS INSTITUTE (CSI) MASTERFORMAT. THIS SECTION MUST BE CAREFULLY REVIEWED AND EDITED BY THE ARCHITECT OR THE ENGINEER TO MEET THE REQUIREMENTS OF THE PROJECT. COORDINATE THIS SECTION WITH OTHER SPECIFICATION SECTIONS IN THE PROJECT MANUAL AND WITH THE DRAWINGS.

WHERE REFERENCE IS MADE THROUGHOUT THIS SECTION TO "PROVIDE", "INSTALL", "SUBMIT", ETC., IT SHALL MEAN THAT THE CONTRACTOR, SUBCONTRACTOR, OR CONTRACTOR OF LOWER TIER SHALL "PROVIDE", "INSTALL", "SUBMIT", ETC., UNLESS OTHERWISE INDICATED.

THIS SECTION IS WRITTEN TO INCLUDE THE 2004 MASTERFORMAT AND THE 1995 MASTERFORMAT VERSIONS. WHERE APPLICABLE, THESE ITEMS ARE BRACKETED AND, IN EACH CASE, UNLESS OTHERWISE INDICATED, THE FIRST CHOICE APPLIES TO THE 2004 MASTERFORMAT AND THE SECOND CHOICE APPLIES TO THE 1995 MASTERFORMAT.

SECTION 262501.02

LOW-VOLTAGE BUSWAYS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Plug-in busway.
- B. Busway tap off units.
- C. Busway power feed units.

1.2 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 26 0573 - Overcurrent Protective Device Coordination Study.

1.3 REFERENCE STANDARDS

- A. IEC 60309 - Plugs, Socket-Outlets and Couplers for Industrial Purposes; International Electrotechnical Commission; 2012.
- B. IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code); International Electrotechnical Commission; 2001-02.
- C. IEC 61557-12 - Electrical Safety in Low Voltage Distribution Systems Up to 1000 V A.C. and 1500 V D.C. - Equipment for Testing, Measuring or Monitoring of Protective Measures - Part 12: Performance Measuring and Monitoring Devices (PMD); 2007-08.
- D. IEC 62053-22 - Electricity Metering Equipment (A.C.) - Particular Requirements - Part 22: Static Meters for Active Energy (Classes 0,2 S and 0,5 S); 2003-01.
- E. IEC 62053-23 - Electricity Metering Equipment (A.C.) - Particular Requirements - Part 23: Static Meters for Reactive Energy (Classes 2 and 3); 2003-01.
- F. ISO 9001 - Quality Management Systems-Requirements; International Standards Organization; 2008.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- H. NECA 408 - Standard for Installing and Maintaining Busways; National Electrical Contractors Association; 2009.
- I. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.
- J. NEMA BU 1 – Busways, 1999
- K. NEMA BU 1.1 - General Instructions for Handling, Installation, Operation, and Maintenance of Busway Rated 600 Volts or Less; National Electrical Manufacturers Association; 2010.

- L. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- M. NFPA 75 - Standard for the Protection of Information Technology Equipment; 2013.
- N. UL 50 – Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- O. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- P. UL 498 – Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- Q. UL 857 - Busways; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 1. Coordinate the arrangement of busway with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others. Coordinate the work with other trades to avoid installation of obstructions within busway clearances.
 2. Coordinate arrangement of busway with the dimensions and clearance requirements of the actual equipment to be installed.
 3. Coordinate the work with placement of supports, anchors, etc. required for mounting.
 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Pre-Installation Meeting: Convene **[one week]** **[_____]** prior to performing field measurements for busway fabrication drawings; require attendance of all affected installers. Review proposed routing, sequence of installation, and protection requirements for installed busway.
- C. Sequencing:
 1. Perform field measurements prior to busway fabrication.

1.5 SUBMITTALS

- A. See Section **01 3000** - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for busway system components and accessories. Include dimensions, weight, materials, fabrication details, finishes, and service condition requirements. Indicate voltage and current ratings, short circuit current ratings, configurations, and installed features and accessories.
 1. Include characteristic trip curves for each type and rating of circuit breaker plug-in device **[upon request]** **[where indicated]** **[_____]**.
 2. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
 3. Include documentation of listed series ratings **[upon request]**.
- C. Field Quality Control Test Reports.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Project Record Documents: Record actual routing of busway.
 1. Include actual installed locations of tap off units.
- F. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Hookstick(s) for Tap Off Units: **[One]** **[One for each _____ feet (_____ m) of installed plug-in busway]** **[_____]**, with length as required for suitable operation of tap off unit handle from floor or working platform.
 3. Extra Tap Off Unit(s): **[_____]**.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum **[five]** [] years documented experience.
- D. Installer Qualifications: Company **[specializing in performing the work of this section]** [] with minimum **[five]** [] years **[documented]** [] experience with busway systems of similar size, type, and complexity.
- E. Products:
 - 1. Products: Listed and classified by **[Underwriters Laboratories Inc.]** **[testing firm acceptable to authorities having jurisdiction]** [] as suitable for the purpose specified and indicated.
 - 2. Manufactured in a facility certified as complying with ISO 9001.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store busway in accordance with manufacturer's instructions, NECA 408, and NEMA BU1.1.
- B. Store products indoors in a clean, dry space having a uniform temperature to prevent condensation (including outdoor busway, which is not weatherproof until completely and properly installed). Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle products carefully to avoid damage to internal components, enclosure, and finish.

1.8 FIELD CONDITIONS

- A. Maintain field conditions within required service conditions during and after installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

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- A. Basis of Design: Schneider Electric; **[Powerbus Plug-In Busway]**: www.schneider-electric.us.
 - B. Other Acceptable Manufacturers:
 - 1. [].
 - 2. [].
 - C. Substitutions: **[See Section 01 6000 - Product Requirements]** **[Not permitted]** [].
 - D. Products other than basis of design are subject to compliance with specified requirements **[and prior approval of Engineer]**. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.
 - E. Source Limitations: Furnish busway system and associated components and accessories produced by **[the same manufacturer as the other electrical distribution equipment used for this project]** **[a single manufacturer]** **[the same manufacturer as the existing busway system]** [] and obtained from a single supplier.

2.2 BUSWAY SYSTEM

- A. Provide **[new]** **[modifications and additions to existing]** busway system consisting of all required components, fittings, devices, supports, accessories, etc. as necessary for a complete operating system.
- B. Description: Prefabricated sectionalized enclosed bus assemblies and associated fittings and devices; listed and labeled as complying with UL 857.
- C. Service Conditions:
 - 1. Provide busway system and associated components suitable for operation under the following service conditions without derating:

- a. Altitude: Less than 6,600 feet (2,000 m).
 - b. Ambient Temperature:
 - 1) Busway Lengths and Fittings: Between -22 degrees F (-30 degrees C) and 104 degrees F (40 degrees C).
 - 2) Circuit Breaker Tap Off Units: Between 32 degrees F (0 degrees C) and 104 degrees F (40 degrees C).
 - 3) Metering Units: Between 14 degrees F (-10 degrees C) and 104 degrees F (40 degrees C).
 - c. Relative Humidity: Less than 95 percent, non-condensing.
2. Provide busway system and associated components suitable for operation at indicated ratings under the service conditions at the installed location.
 - a. Altitude: [_____ feet (_____ m)].
 - b. Ambient Temperature: Between [_____ degrees F (_____ degrees C)] and [_____ degrees F (_____ degrees C)].
 - c. [_____].

D. Short Circuit Current Rating:

--CHOOSE ONE OF THE TWO PARAGRAPHS BELOW--

1. Provide busway system and associated components with listed short circuit current rating **[not less than the available fault current at the installed location as indicated on the drawings]** [not less than ____ rms symmetrical amperes] [as indicated on the drawings] [_____].
2. Provide busway system and associated components with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study **[performed in accordance with Section 26 0573]** [_____].
3. Listed series ratings are **[acceptable, except where not permitted by motor contribution according to NFPA 70]** [acceptable only where specifically indicated] [not acceptable] [_____].
4. Label equipment utilizing series ratings as required by NFPA 70.

2.3 PLUG-IN BUSWAY

A. General Requirements:

1. Busway Type: Totally enclosed, non-ventilated; suitable for installation in any mounting orientation the busway is designed for, without derating.
2. Temperature Rise: Not exceeding 55 degrees C, when operating at continuous rated current in an ambient temperature of 104 degrees F (40 degrees C).
3. Busbars: solid rectangular bar type, shall not use formed channel conductors.
4. Busbars and stabs to be suitably plated at all electrical contact points.
5. Housing Material: Electrical-grade extruded aluminum.
6. Joints: High-pressure spring type copper connection shall not require special tools or bus connectors to join busway sections and shall not require maintenance after installation.
7. Voltage Drop:
 - a. Voltage drop specified is based on the busway operating at full rated current and at stabilized operating temperature in 86 degrees F (30 degrees C) ambient.
 - b. Do not exceed 3.0 volts per 100 feet (30.48 m) for three phase, line-to-line voltage drop based on worst case single concentrated load at the end of a busway run (one half of the concentrated load voltage drop for typical distributed loading along the length of the plug-in busway run).
8. Provide cover at each unused plug-in opening.
9. Provide means for mechanical support and alignment of tap off units.
10. Enclosure environmental and ingress protection rating shall be indoor IP40 rating for busway housing installed in standard or side mount orientations.
11. Do not use track bus or busway with continuous opening plug-in housing.

- B. Plug-In Busway [Type _____] - Basis of Design: Schneider Electric; Square D Powerbus Plug-In Busway.
1. Voltage: [600V] [415V] [208V] [As indicated on the drawings] [_____].
 2. Ampere Rating:
 - a. 100 A (up to 600 V).
 - b. 225 A (up to 600 V).
 - c. 400 A (up to 600 V).
 - d. As indicated on the drawings.
 3. Short Circuit Current Rating:
 - a. 100 A: 14 kA @ 600 V
 - b. 225 A: 22 kA @ 600 V
 - c. 400 A: 35 kA @ 600 V
 4. Configuration:
 - a. 3 phase, 4-bar (100 percent capacity neutral), with integral housing ground.
 - b. As indicated on the drawings.
 5. Busbar Material: Silver-plated copper.
 6. Plug-In Opening Spacing: [Enhanced high density spacing - 11.4 inches (290 mm) nominal between openings; 20 openings (10 per side) for standard straight lengths of 10 feet (3 m); 6 openings (3 per side) for straight lengths of 4 feet (1.2 m)] [_____].
 7. Housing Finish: [Black] [_____].

2.4 BUSWAY TAP OFF UNITS

- A. Description: Tap Off Units suitable for use with installed busway; types, ratings, configurations, and features as indicated [on the drawings] [_____].
- B. General Requirements:
1. Interchangeable on all available busway ratings without alteration or modification.
 2. No conductive projections extend into busway housing other than plug-in stabs to minimize potential tracking across non-current carrying parts.
 3. Provide tap off units [with minimum enclosure rating of NEMA 250, Type 1] [_____] unless otherwise indicated.
- C. Circuit Breaker Tap Off Units:
1. Provide optional hook stick operable unit [where unit cannot be operated from the floor or working platform] [_____].
 2. Provide optional hook stick [where unit cannot be operated from the floor or working platform] [_____].
 3. Molded Case Circuit Breakers:
 - a. Description: Circuit breakers listed and labeled as complying with UL 489.
 - b. Interrupting Capacity:
 - 1) Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating [indicated, but not less than:] [indicated.] [_____]
 - (a) [10,000] [option: 22,000] [_____] rms symmetrical amperes at 208Y/120 VAC.
 - (b) [18,000] [option: 35,000] rms symmetrical amperes at 480Y/277 VAC.
 - 2) Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - 3) Series Rated Systems: Provide circuit breakers listed in combination with upstream devices to provide interrupting rating not less than the short circuit current rating indicated.

--CHOOSE ONE OR MORE OF THE TAP OFF UNIT TYPE PARAGRAPHS BELOW--

4. 208V Units With Circuit Breaker(s) and Drop Cord(s)/Connector(s):
 - a. 240 VAC maximum units accommodate up to 6 circuit breaker pole positions for up to 3 drop cord/connector circuits.

- b. Drop Cords: SOOW type; factory-wired and appropriately sized to each circuit breaker ampere rating. Drop cord to pass through and be retained by a cable gland in the tap off unit which protects the cable as an outlet bushing while providing strain relief and retention from cable pull-out per UL strain relief strength test.
 - c. Units mount without interference to immediately adjacent outlets on enhanced high density busway.
 - d. [Type _____] Basis of Design: Schneider Electric; Powerbus PBPQOU tamper-resistant front cover type Plug-In Device (QOU 240V circuit breakers with drop cords/connectors).
 - 1) Quantity of Drop Cords: [As indicated] [One] [Three] [_____].
 - 2) Drop Cord Length(s): [As indicated] [One-cord Tap Off Unit: 3 feet (0.9 m)] [3-cord Tap Off Unit: 3feet (0.9m), 5 feet (1.5 m), and 7 feet (2.0 m)] [_____].
 - 3) Connector Type and Rating: [As indicated]
 - (a) NEMA L5-20R
 - (b) NEMA L5-30R
 - (c) NEMA L6-20R
 - (d) NEMA L6-30R
 - (e) NEMA L21-20R
 - (f) NEMA L21-30R
 - (g) CS8364C (50A)
 - (h) IEC 309 60A 3P+PE
 - 4) Connector Short Circuit Current Rating: 10kAIC
 - 5) Circuit Breaker Rating(s): [Select according to drop cords/connectors provided] [_____].
5. 415V Units With Circuit Breaker(s) and Drop Cord(s) with Connector(s):
- a. 480Y/277V VAC maximum units accommodate up to 3 circuit breaker pole positions for up to 3 drop cord/connector circuits.
 - b. Drop Cords: SOOW type; factory-wired and appropriately sized to each circuit breaker ampere rating. Drop cord to pass through and be retained by a cable gland in the tap off unit which protects the cable as an outlet bushing while providing strain relief and retention from cable pull-out per UL strain relief strength test.
 - c. Units mount without interference to immediately adjacent outlets on both standard density and enhanced high density busway.
 - d. [Type _____] Basis of Design: Schneider Electric; Powerbus PBPEDU Plug-In Device (EDB circuit breakers for use on 415Y/240V, 240V or 208Y/120V systems with drop cords/connectors).
 - 1) Quantity of Drop Cords: [As indicated] [One] [Three] [_____].
 - 2) Drop Cord Length(s): [As indicated] [One-cord Tap Off Unit: 3 feet (0.9 m)] [3-cord Tap Off Unit: 3feet (0.9m), 5 feet (1.5 m), and 7 feet (2.0 m)] [_____].
 - 3) Connector Type and Rating: [As indicated]
 - (a) 3-wire IEC 309 20A, 240V
 - (b) 3-wire IEC 309 30A, 240V
 - (c) 5-wire IEC 309 20A, 415V
 - (d) 5-wire IEC 309 30A, 415V
 - (e) 5-wire IEC 309 60A, 415V
 - 4) Connector Short Circuit Current Rating: 10kAIC
 - 5) Circuit Breaker Rating(s): [Select according to drop cords/connectors provided] [_____].
6. Units With Circuit Breaker(s), Drop Cord(s)/Connector(s) plus Metering and Communication:

- a. 480Y/277 VAC maximum units accommodate up to 3 circuit breaker pole positions for up to 3 drop cord/connector circuits.
- b. Drop Cords: SOOW type; factory-wired and appropriately sized to each circuit breaker ampere rating. Drop cord to pass through and be retained by a cable gland in the tap off unit which protects the cable as an outlet bushing while providing strain relief and retention from cable pull-out per UL strain relief strength test.
- c. Units mount without interference to immediately adjacent outlets on high density busway.
- d. [Type _____] Basis of Design: Schneider Electric; Powerbus PBPEDU--M Plug-In Device with PowerLogic PM5350xB series power meter (EDB, or optional higher interrupting EGB circuit breakers for use on 415Y/240V, 240V or 208Y/120V systems with drop cords/connectors and power meter with communications).
 - 1) Quantity of Drop Cords: [As indicated] [One] [Three] [_____]
[_____].
 - 2) Drop Cord Length(s): [As indicated] [One-cord Tap Off Unit: 3 feet (0.9 m)] [3-cord Tap Off Unit: 3feet (0.9m), 5 feet (1.5 m), and 7 feet (2.0 m)] [_____].
 - 3) Connector Type and Rating: [As indicated]
 - (a) NEMA L5-20R
 - (b) NEMA L5-30R
 - (c) NEMA L6-20R
 - (d) NEMA L6-30R
 - (e) NEMA L21-20R
 - (f) NEMA L21-30R
 - (g) CS8364C (50A)
 - (h) IEC 309 60A 3P+PE
 - (i) 3-wire IEC 309 20A, 240V
 - (j) 3-wire IEC 309 30A, 240V
 - (k) 5-wire IEC 309 20A, 415V
 - (l) 5-wire IEC 309 30A, 415V
 - (m) 5-wire IEC 309 60A, 415V
 - 4) Connector Short Circuit Current Rating: 10kAIC
 - 5) Circuit Breaker Rating(s): [Select according to drop cords/connectors provided] [_____].
- e. Provide tap off units with integral factory installed and wired power meter with multi-circuit measurement and communication capability [where indicated] [for each tap off unit] [_____].
 - 1) Meter: Comply with IEC 61557-12, IEC 62053-22, and IEC 62053-23; listed and labeled as complying with UL/IEC 61010-1.
 - 2) Measured Parameters:
 - (a) Voltage (total, phase-phase, and phase-neutral).
 - (b) Current (total, phases, and neutral).
 - (c) Power (real, reactive, and apparent).
 - (d) Power factor.
 - (e) Frequency.
 - (f) Demand values.
 - (g) Active and reactive energy.
 - (h) Percent voltage unbalance.
 - (i) Percent current unbalance.
 - (j) Total harmonic distortion.
 - 3) Meter Accuracy: +/- 0.3% for Phase Current from 0.5 to 9A and for L-N Voltage from 57 to 347V

- 4) Monitor voltage and current parameters using true RMS measurements for accurate representation of non-linear waveforms containing harmonic distortions.
- 5) Provide alarm capability with event log recorder for last 40 alarms.
- 6) Provide integral display and separate LED alarm indicators for measured parameters and alarms.
- 7) Communication Capability: Measured power parameters and alarm data to be available for remote monitoring using tap off units' integrated RJ45 communications port using Modbus protocol. Provide Shielded Twisted Pair wiring or Shielded Cat 5E communication cabling where not furnished by busway manufacturer
- 8) PowerLogic EGX300: For remote monitoring capabilities, an EGX300 Gateway is required. The EGX300 is located in the Feed Unit with Metering or in a separate EGX300 Tap Off Unit. A maximum of 32 Modbus network drops for units with metering shall be daisy-chained together back to the EGX300.

2.5 BUSWAY POWER FEED UNITS

- A. Provide power feed units with ratings and configurations as indicated or as required for connection of mains conductors to busway runs.
- B. General Requirements:
 1. Description: Power Feed Units suitable to receive incoming conduits/conductors and sized to meet minimum wire bending space requirements.
 2. Provides access to the termination box, bus bar supports, bus terminal connectors, wire lug connectors, necessary insulation barriers and required bolting hardware.
 3. Housing: Steel, with manufacturer's standard finish unless otherwise indicated.
 4. Phase and neutral box lug size range:
 - a. Copper: 250-600kcmil
 - b. Aluminum: 250-600kcmil
 Note: See NEC Table 310.15 for minimum size based on system current capacity.
 5. Ground box lug size range:
 - a. Copper: 2/0 to 10 AWG
 - b. Aluminum: 2/0 to 6 AWG
 6. Enclosure environmental and ingress protection rating shall be indoor IP40.
 - a. Basis of Design: Schneider Electric; Powerbus PBCF--TB power feed unit.
- C. Power Feed Units With Metering:
 1. Provide Power Feed Unit with compartmentalized power and metering sections and integral factory installed and wired power meter with communication capability **[where indicated] [for each busway run] [_____]**.
 2. Meter: Comply with IEC 61557-12, IEC 62053-22, and IEC 62053-23; listed and labeled as complying with UL/IEC 61010-1.
 3. Measured Parameters:
 - a. Voltage (total, phase-phase, and phase-neutral).
 - b. Current (total, phases, and neutral).
 - c. Power (real, reactive, and apparent).
 - d. Power factor.
 - e. Frequency.
 - f. Demand values.
 - g. Active and reactive energy.
 - h. Percent voltage unbalance.
 - i. Percent current unbalance.
 - j. Total harmonic distortion.
 4. Meter Accuracy: +/- 0.3% for Phase Current from 0.5 to 9A and for L-N Voltage from 57 to 347V
 5. Monitor voltage and current parameters using true RMS measurements for accurate representation of non-linear waveforms containing harmonic distortions.

6. Provide alarm capability with event log recorder for last 40 alarms.
7. Provide integral display and separate LED alarm indicators for measured parameters and alarms.
8. Communication Capability: Measured power parameters and alarm data to be available for remote monitoring using separately provided Cat 5 or higher UTP cabling connected to the Power Feed Unit's integrated RJ45 communications port. Plug into your energy usage with simple mouse click via the PowerLogic EGX300 integrated gateway-server . Only a web browser and Ethernet network are required to remotely log and display real-time data.
Monitor row level energy demand with the new PowerLogic™ PM5350xB Power Meter, which offers superior accuracy, a comprehensive measurement package, extensive alarm capabilities, and simple operation. Provide Shielded Twisted Pair wiring or Shielded Cat 5E communication cabling where not furnished by busway manufacturer to daisy-chain the PowerLogic PM5350xB Power Meter in the Feed Unit with Metering to the Metered Tap Off Units.
9. Basis of Design: Schneider Electric; Powerbus PBCF--TB--M power feed unit with PowerLogic PM5350xB series power meter and EGX300 gateway.

PART 3 EXECUTION BY [CONTRACTOR] [OWNER]

3.1 EXAMINATION

- A. Verify that field measurements are as shown on drawings.
- B. Verify that the ratings of busway system components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive busway and associated supports.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

- A. Perform insulation resistance testing on individual current-carrying busway system components prior to installation in accordance with NECA 408 and NEMA BU1.1.

3.3 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install busway in accordance with NECA 1 (general workmanship), NECA 408, and NEMA BU1.1.
- C. Unless otherwise indicated, arrange busway to be parallel or perpendicular to building lines.
- D. Arrange busway to provide required clearances and maintenance access.
- E. Install busway plumb and level, with sections aligned and with horizontal runs at the proper elevation.
- F. Unless otherwise indicated, orient busway with plug-in openings on sides (standard-mount, edgewise housing orientation).
- G. Maintain proper phase sequence throughout busway system.
- H. Provide end closures at unconnected ends of busway runs.
- I. Busway Support:
 1. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 2. Provide sway bracing as indicated or as required to keep busway runs straight and prevent rotation and movement, accounting for unbalanced weight distribution of tap off units where applicable.

--CHOOSE ONE OF THE TWO PARAGRAPHS BELOW--

3. Use manufacturer's recommended hangers and supports, located at intervals complying with NFPA 70 and manufacturer's requirements. Provide required support and attachment components **[in accordance with Section 26 0529] [_____]**, where not furnished by busway manufacturer.

4. Use manufacturer's recommended IT cabinet mounting kits to support busway above NetShelter™ SX IT racks and eliminate overhead suspension installation. Provide supports and mounting hardware located at intervals per manufacturer's requirements.
- J. Penetrations:
1. Provide suitable flanges where busway penetrates building elements.
 2. Install firestopping to preserve fire resistance rating of building elements, using materials and methods specified **[in Section 07 8400]** **[in Section _____]** **[_____]**.
- K. Tap Off Units:
1. Install tap off units on plug-in busway in accordance with manufacturer's instructions.
 2. Unless otherwise indicated, final connections from tap off units to loads to be provided by **[Contractor]** **[Owner]** **[_____]**.
- L. Provide grounding and bonding **[in accordance with Section 26 0526]** **[in accordance with Section _____]** **[_____]**.
- M. Identify busway **[in accordance with Section 26 0553]** **[in accordance with Section _____]** **[_____]**.

3.4 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Provide services of a manufacturer's authorized representative to **[observe installation and assist in inspection and testing]** **[perform inspection and testing]** **[_____]**. Include manufacturer's reports with submittals.
- C. Electrically isolate busway system before energizing and perform insulation resistance testing in accordance with NECA 408 and NEMA BU1.1.
 1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.
- D. Perform infrared scanning of energized busway system under maximum load conditions in accordance with NECA 408.
- E. Correct deficiencies and replace damaged or defective busway system components.

3.5 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust supports as required to minimize strain on busway and associated components.
- C. Metering Units: Set field-adjustable metering and communication device settings and configure network addresses in coordination with Owner's network administration requirements.

3.6 CLEANING

- A. Clean dirt and debris from busway enclosure and components in accordance with manufacturer's instructions. Do not use compressed air or a blower in order to prevent debris infiltration.
- B. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.7 CLOSEOUT ACTIVITIES

- A. See Section 01780 - Closeout Submittals, for closeout submittals.
- B. See Section 01820 - Demonstration and Training, for additional requirements.
- C. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 2. Provide minimum of **[four hours]** **[one day]** **[_____]** of training.
 3. Instructor: **[Manufacturer's authorized representative]** **[Qualified contractor familiar with the project and with sufficient knowledge of the installed system]** **[_____]**.

4. Location: **[At project site]** [_____].

3.8 PROTECTION

A. Protect busway system from subsequent construction operations.

END OF SECTION