

SECTION 16466 BUSWAYS

PART 1 GENERAL

1.1 SUMMARY:

- A. This section includes plug-in and feeder busways, 600 V and under.

1.2 SUBMITTALS:

- A. Product Data: Submit manufacturer's data for busways, including sizes and types of enclosures, finishes, bus joints, bar configurations, temperature rise above ambient, and electrical ratings and characteristics.
- B. Coordination Drawings: Layout floor plans and elevations showing busway system. Designate components and accessories including clamps, brackets, hanger rods, bus plugs, tap boxes, expansion joints, straight lengths, fittings, firestops, and weather seals. Show accurately scaled components and spatial relationships to adjacent equipment and building features. Show busway types, dimensions, and finishes.

1.3 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacture of busways, of types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firms with at least 3 years of successful installation experience on projects with electrical raceway work similar to that required for this project.

1.4 DELIVERY, STORAGE, AND HANDLING:

- A. Store busways in clean dry space having a uniform temperature and constant air circulation. If uniform temperature space is not available, provide temporary heat to keep storage space 10 deg F minimum above temperature of surrounding spaces.
- B. Handle busways to avoid damage to internal components, enclosures, and finishes. Avoid subjecting busway to twisting, denting, impact, and rough handling. Do not install damaged busway; remove from project site.
- C. Do not store busways outdoors. When unavoidable, provide temporary enclosures to protect against weather, moisture and debris. Install temporary electrical heating within enclosure to prevent condensation.

1.5 EXTRA MATERIALS:

- A. Furnish the following extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.
 - 1. Bus Plugs: Furnish quantity of bus plug units equal to ten percent of amount installed, but no less than one unit of each type installed.
 - 2. Provide spare plug-in devices as follows:

No. of Spares	AMP Rating	No. of Poles

PART 2 PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Square D Co.
2. Westinghouse Electric Corp.
3. Siemens Energy & Automation, Inc.
4. General Electric Co.
5. Cutler-Hammer Group; Eaton Corp.

2.2 BUSWAYS, GENERAL:

- A. Busway System: Indicated types, and complete with manufacturer's recommended fittings and accessories as indicated and as required for a complete, functioning installation.
- B. Busway features shall include conductor bus bars, electrical insulators, enclosures, flanges, elbows, offsets, cable tap boxes, expansion joints, end closures, supports, and other components and accessories needed to form complete systems.
- C. Ratings: Provide three phase busway with voltage and current ratings and requirements for neutral and ground conductors as indicated. Short circuit ratings of busway shall be in excess of those indicated for each location.
- D. Conductor Material: Aluminum with not less than 55 percent conductivity.
- E. Provide an add/alternate to furnish conductor material of copper with not less than 98 percent conductivity.
- F. Bus Bars: Plated at electrical contact surfaces and insulated over entire length, except at contact surfaces, with 130 degrees C class insulation.
- G. Temperature Rise: Not in excess of 55 degrees C above an ambient temperature of 40 degrees C at any point in the busway when busway is operated at rated load current at 60 Hz.
- H. Overcurrent Protective Devices (OCPD's): Provide type, rating, and features as indicated. Comply with Division 16 Section on Overcurrent Protective Device, with OCPD's adapted to busway installation. Tandem circuit breakers shall not be used. Multiple breakers shall have common trip.

2.3 FEEDER BUSWAY:

- A. Construction: Totally enclosed, nonventilated, and suitable for indoor installation except as otherwise indicated.

- B. Weatherproof Construction: Where indicated, totally enclosed, nonventilated, and suitable for outdoor installation exposed to the weather. Provide galvanized steel enclosure and corrosion resistant hardware and fasteners.
 - C. Conductor joints for one modular length to the next shall be arranged in joint stacks incorporating busway conductors, and each joint stack shall be arranged for tightening with a single bolt. Joint design shall be such that any length or fitting of a run may be removed without disturbing the connecting lengths.
- 2.4 PLUG-IN BUSWAY:
- A. Construction: Totally enclosed, nonventilated and suitable for indoor installation.
 - B. Conductor joints for one modular length to the next shall be arranged in joint stacks incorporating busway conductors, and each joint stack shall be arranged for tightening with a single bolt. Joint design shall be such that any length or fitting of a run may be removed without disturbing the connecting lengths.
 - C. Plug-In Openings: Five, dead-front, hinged cover openings on each side of each 10 feet length of busway. Openings shall be useable simultaneously.
- 2.5 PLUG-IN DEVICES
- A. General: Compatible with the connected busway and of types as indicated. Plug-in devices shall be equipped with spring reinforced contact fingers arranged so they will not make contact with bus bars during plug insertion until the device housing is positively grounded to the busway. Plug-in devices shall lock in position mechanically and make positive grounding contact in addition to the power connection when in the fully inserted position. A safety interlock on bus plugs having "on" and "off" positions to prevent insertion when they are in the "on" position. Bus plugs for use with busway having an integral or internal ground bus shall be equipped with a grounding finger arranged to make positive contact with the ground bus before phase connections make contact when inserting the plug. Mounting hardware shall be captive on bus plug housing. Provide equipment engraved nameplate for each plug in device. Refer to section on Electrical Identification.
 - B. Circuit Breaker Plugs: Capable of operation from the floor. Circuit breaker shall comply with NEMA AB 1, "Molded Case Circuit Breakers" with ratings and characteristics as indicated. Breaker shall have defeatable interlock with bus plug door.
- 2.6 FINISHES:
- A. Indoor Busway: Manufacturer's standard finish over corrosion resistant pretreatment.
- 2.7 SUPPORTS AND ACCESSORIES:
- A. General: As recommended by busway manufacturer and conforming to Division 16 section on supporting devices.
 - B. Spring Mounted Vertical Riser Supports: Adjustable for leveling and spring tension and arranged to permit relative movement between floor and busway.
 - C. Expansion Section: Capacity and conductor provisions same as adjacent busway section. Arranged to absorb expansion and contraction of bus bars and housing.

- D. Bus shall be designed, constructed, and supported to meet applicable seismic zone requirements.

2.8 FIRE STOPPING:

- A. General: Materials UL listed and labeled and FM approved for fire ratings consistent with penetrated barriers.
- B. Wall and Floor Flanges: Sheet steel, 12 gage minimum close fitting to busway and arranged to close the wall or floor opening at the busway penetration.
- C. Two-Part Sealant: Formed-in-place sealant.

PART 3 EXECUTION

3.1 INSTALLATION OF BUSWAYS:

- A. Install busways and accessories as indicated and in compliance with applicable requirements of NEC and NEMA BU 1.1, "Instructions for Handling, Installation, Operation and Maintenance of Busway Rated 600 V or Less." Conform to manufacturer's written instructions except where more stringent requirements apply.
- B. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque values for equipment connectors. Where manufacturer's torque values are not indicated, tighten connectors and terminals to comply with torque values specified in UL Standards 486A and 486B.
- C. Expansion Fittings: Install at locations where busway crosses a building expansion joint. In addition, install at intervals in long runs or risers where length comes within 10 percent of the maximum length without expansion joints stated by the manufacturer for the type and material of busway installed.
- D. Fire Stops: Install fire stops where busway penetrates fire-rated walls and floors. Seal between busway and opening and around opening with sealant or sealing mortar having NRTL listed fire rating not less than that of wall, or floor penetrated. Where busway manufacturer's sealing and stopping devices are not fire rated, provide fire stopping as required to satisfy authority having jurisdiction.
- E. Meet requirements of Division 16 Section, Overcurrent Protective Devices, for each bus plug furnished.
- F. Provide warning labels at all access openings and end sections.
- G. Floor Penetrations: Provide a minimum 4 inch-high curb around busway within 12 inches of penetrations of floors to prevent water from spills and leaks from contacting busway.
- H. Support busway from the building structure independently from other suspended items at intervals not exceeding 5 feet unless otherwise designed and marked.
- I. Conform to manufacturer's recommendations for selection, spacing, and installation of supports.
- J. Strength of each support including fastenings to the structure shall be adequate to support busway load multiplied by a safety factor of at least four or 200 lb, whichever is greater.

- K. Fastening Supports: Unless otherwise indicated, fasten supports securely to the building structure as specified in Division 16 Section on supporting devices.
- 3.2 GROUNDING:
- A. Provide electrical bonding and equipment grounding connections for busways as indicated.
 - B. Tighten bonding and grounding connections to comply with torque values specified in UL Standards 486A and 486B to assure permanent and effective grounding.
- 3.3 FIELD QUALITY CONTROL:
- A. Test busway runs prior to energizing as follows and provide written report of tests.
 - B. Phasing: Verify that proper phase relationships exist between source, busway, and connected equipment using phase rotation meter and verifying phase continuity from source to equipment.
 - C. Insulation Resistance: Measure for all busway components with 1000 Volt d.c. megohmmeter and compare in report with manufacturer's stated acceptable values. Measure each phase to phase and each phase to ground.
 - D. Energize busway and demonstrate functioning in accordance with requirements.
 - E. Test Failures: Correct deficiencies identified by tests and make ready for retest. Verify that equipment meets the specified requirements.
 - F. Test each size of busway for voltage drop and report results. Indicate nominal voltage applied and voltage at output terminations for each phase to phase and phase to neutral connection.
 - G. Compare test results as follows:
 - One megohm per 100 feet of busway.
 - 1. Provide 15 minute tests for each phase, neutral, and ground bus with readings at 1 minute intervals.
- 3.4 CLEANING AND FINISH REPAIR:
- A. Upon completion of installation of busways, remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches and abrasions.
 - B. Galvanized Finish: Repair damage using a zinc-rich paint recommended by the manufacturer.
 - C. Paint Finish: Repair damage using matching touch-up coating recommended by the manufacturer.
- 3.5 ADJUSTMENT:
- A. Align busway runs vertically and horizontally to eliminate sags and twists. Provide support stiffeners at locations where indicated and where there is excessive movement.
 - B. Check bus plug circuit breaker trip settings, fuse ratings, and starter overload elements against connected loads and revise as required to conform to recommended values.

END OF SECTION 16466