

## **SECTION 262500 - ENCLOSED BUS ASSEMBLIES**

Latest Update 5-6-2017 See underlined text for Edits.

(Engineer shall edit specifications and blue text in header to meet project requirements. This includes but is not limited to updating Equipment and/or Material Model Numbers indicated in the specifications and adding any additional specifications that may be required by the project. Also turn off all "Underlines".)

### **PART 1 - GENERAL**

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section and all other sections of Division 26.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Feeder-bus assemblies.
  - 2. Plug-in bus assemblies.
  - 3. Bus plug-in devices.

#### 1.3 DEFINITIONS

- A. TVSS: Transient voltage surge suppressor.

#### 1.4 SUBMITTALS

- A. Product Data Sheets: Provide product data for each component. Include electrical ratings, dimensions, mounting, supports, materials, fire stop and weather stops.
- B. Shop Drawings: For each type of [bus assembly] [and plug-in device]. **<Engineer to Edit for Project Requirements>**
  - 1. Show fabrication and installation details for enclosed bus assemblies. Include plans, elevations, and sections of components. Designate components and accessories, including clamps, brackets, hanger rods, connectors, straight lengths, and fittings.
  - 2. Show fittings, materials, fabrication, and installation methods for [listed fire-stop barriers] [and] [weather barriers]. **<Engineer to Edit for Project Requirements>**
  - 3. Indicate required clearances, method of field assembly, and location and size of each field connection.

4. Detail connections to switchgear, switchboards, transformers, and panelboards.
  5. Wiring Diagrams: Power [and signal] [and control] [signal, and control] wiring.  
<Engineer to Edit for Project Requirements>
- C. Coordination Drawings: Floor plans and sections, drawn to scale. Include scaled bus-assembly layouts and relationships between components and adjacent structural, mechanical, and electrical elements. Show the following:
1. Vertical and horizontal enclosed bus-assembly runs, offsets, and transitions.
  2. Clearances for access above and to the side of enclosed bus assemblies shall meet minimum working clearance, per NEC, for plug-in device installation on each side of bus assembly, depending on orientation
  3. Vertical elevation of enclosed bus assemblies above the floor or bottom of structure shall allow for at least two access ports for plug-in devices per electrical room..
  4. Support locations, type of support, and weight on each support.
- D. Location of adjacent construction elements including light fixtures, HVAC and plumbing equipment, fire sprinklers and piping, signal and control devices, and other equipment.
- E. Product Certificates: For each type of enclosed bus assembly, signed by product manufacturer.
- F. Qualification Data: For [professional engineer] [and] [testing agency].<Engineer to Edit for Project Requirements>
- G. Field quality-control test reports.
- H. Operation and Maintenance Data: For enclosed bus assemblies to include in emergency, operation, and maintenance manuals.

## 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing

laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

- C. Source Limitations: Obtain enclosed bus assemblies [ and plug-in devices] through one source from a single manufacturer. <Engineer to Edit for Project Requirements>
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Comply with NEMA BU 1, "Busways."
- F. Comply with NFPA 70.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle enclosed bus assemblies according to NEMA BU 1.1, "General Instructions for Proper Handling, Installation, Operation and Maintenance of Busway Rated 600 Volts or Less."

#### 1.7 PROJECT CONDITIONS

- A. Derate enclosed bus assemblies for continuous operation at indicated ampere ratings for ambient temperature not exceeding 140°F.
- B. Field Measurements: Verify existing dimensions by field measurements or coordinate with UM project manager. Verify clearness and locate obstructions within manufacturing and installation tolerances of enclosed bus.

#### 1.8 COORDINATION

- A. Coordinate layout and installation of enclosed bus assemblies and suspension system with other construction that penetrates ceilings or floors or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.
- B. Coordinate size and location of concrete curbs around openings for vertical bus. Concrete, reinforcement, and formwork requirements are specified in Division 03.

## 1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Plug-in Units: 10% of amount installed for each size indicated, but no fewer than two unit(s).

## 1.10 WARRANTY/GUARANTEE

- A. See Division 26 Specification Section “Basic Electrical Requirements” for warranty and guarantee requirements.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
1. Eaton Electrical Inc.; Cutler-Hammer Products.
  2. General Electric Company; Electrical Distribution & Control Division.
  3. Square D; Schneider Electric.

### 2.2 ENCLOSED BUS ASSEMBLIES

- A. Feeder-Bus Assemblies: NEMA BU 1, low-impedance bus assemblies in nonventilated housing; single-bolt joints; ratings as indicated.
1. Voltage: [120/208] [240] [480] [277/480] V; 3 phase; [100] [200] [percent neutral capacity]. <Engineer to Edit for Project Requirements>
  2. Temperature Rise: 55°C above 40°C ambient maximum for continuous rated current.
  3. Bus Materials: Current-carrying copper conductors, fully insulated with Class 130C insulation except at joints; plated surface at joints.
  4. Ground:
    - a. 50 % capacity internal bus bars of material matching bus material.
    - b. 50 % capacity isolated, internal bus bar of material matching bus material.
  5. Enclosure: [Steel with manufacturer's standard finish] [Aluminum with manufacturer's standard finish] [Weatherproof, steel or aluminum with

- manufacturer's standard finish, sealed seams, drains, and removable closures].  
<Engineer to Edit for Project Requirements>
6. Fittings and Accessories: Manufacturer's standard.
  7. Mounting: Arranged flat, edgewise, or vertically without derating.
- B. Plug-in Bus Assemblies: NEMA BU 1, low-impedance bus assemblies in nonventilated housing; single-bolt joints; ratings as indicated.
1. Voltage: [120/208] [240] [480] [277/480] V; 3 phase; [100] [200] [percent neutral capacity]. <Engineer to Edit for Project Requirements>
  2. Temperature Rise: 55°C above 40°C ambient maximum for continuous rated current.
  3. Bus Materials: Current-carrying copper conductors, fully insulated with Class 130C insulation except at stabs and joints; plated surface at stabs and joints.
  4. Ground:
    - a. 50 % capacity internal bus bar of material matching bus material.
    - b. 50 % capacity isolated, internal bus bar of material matching bus material.
  5. Enclosure: [Steel, with manufacturer's standard finish, plug-in openings twenty four (24) inches o.c., and hinged covers over unused openings] [Aluminum, with manufacturer's standard finish, plug-in openings twenty four (24) inches o.c., and hinged covers over unused openings]. <Engineer to Edit for Project Requirements>
  6. Fittings and Accessories: Manufacturer's standard.
  7. Mounting: Arranged flat, edgewise, or vertically without derating.

## 2.3 PLUG-IN DEVICES

- A. Fusible Switches: NEMA KS 1, heavy duty; with R-type rejection fuse clips to accommodate specified fuses; hookstick-operated handle, lockable with two padlocks, and interlocked with cover in closed position. See Division 26 Section "Fuses" for fuses and fuse installation requirements.
- B. Molded-Case Circuit Breakers: NEMA AB 1; hookstick-operated handle, lockable with two padlocks, and interlocked with cover in closed position.
- C. TVSS: NEMA 250, Type 1 enclosure with NEMA KS 1, fusible, disconnect switch and external handle to isolate TVSS from busway. TVSS product and installation requirements are specified in Division 26 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits."
- D. Motor Controllers: NEMA ICS 2, Class A, full voltage, nonreversing, across the line, unless otherwise indicated.

1. Control Circuit: 120 V; obtained from integral control power transformer with a control power of enough capacity to operate connected pilot, indicating and control devices, plus 100% spare capacity.
  2. Combination Controller: Factory-assembled combination controller and disconnect switch with or without overcurrent protection as indicated.
    - a. Fusible Disconnecting Means: NEMA KS 1, heavy-duty, fusible switch with R-type rejection fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 947-4-1, as certified by a nationally recognized testing laboratory (NRTL) acceptable to authorities having jurisdiction. See Division 26 Section "Fuses" for fuses and fuse installation requirements.
    - b. Nonfusible Disconnecting Means: NEMA KS 1, heavy-duty, nonfusible switch.
    - c. Circuit-Breaker Disconnecting Means: NEMA AB 1, motor-circuit protector with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
  3. Overload Relay: Ambient-compensated type with inverse-time-current characteristic and NEMA ICS 2, [Class 10] [Class 20] [Class 30] tripping characteristic. Overload relays shall have heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect and with appropriate adjustment for duty cycle. <Engineer to Edit for Project Requirements>
  4. Adjustable Overload Relay: Dipswitch selected for motor running overload protection with NEMA ICS 2, [Class 10] [Class 20] [Class 30] tripping characteristic, and selected to protect motor against voltage and current unbalance and single phasing. Adjustable overload relays shall have Class II ground-fault protection with start and run delays to prevent nuisance trip on starting. <Engineer to Edit for Project Requirements>
- E. Multispeed Motor Controllers: Match controller to motor type, application, and number of speeds; include the following accessories:
1. Compelling relay ensures motor starts only at low speed.
  2. Accelerating relay ensures properly timed acceleration through speeds lower than that selected.
  3. Decelerating relay ensures automatically timed deceleration through each speed.
- F. Accessories: Hookstick operator, adjustable to maximum extension of [14 feet] <Insert dimension>.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Support bus assemblies independent of supports for other elements such as equipment enclosures at connections to panelboards and switchboards, pipes, conduits, ceilings, and ducts.
  - 1. Design each fastener and support to carry two hundred (200) lb or four (4) times the weight of bus assembly, whichever is greater.
  - 2. Support bus assembly to prevent twisting from eccentric loading.
  - 3. Support bus assembly with not less than three eighths (3/8) inch steel rods. Install side bracing to prevent swaying or movement of bus assembly. Modify supports after completion to eliminate strains and stresses on bus bars and housings.
  - 4. Fasten supports securely to building structure according to Division 26 Section "Hangers and Supports for Electrical Systems."
- B. Install expansion fittings at locations where bus assemblies cross building expansion joints. Install at other locations so distance between expansion fittings does not exceed manufacturer's recommended distance between fittings.
- C. Construct rated fire-stop assemblies where bus assemblies penetrate fire-rated elements such as walls, floors, and ceilings. Seal around penetrations according to Division 07 Section "Penetration Firestopping."
- D. Install weatherseal fittings and flanges where bus assemblies penetrate exterior elements such as walls or roofs. Seal around openings to make weathertight. See Division 07 Section "Joint Sealants" for materials and application.
- E. Install a concrete curb at least 4 inches high around bus-assembly floor penetrations.
- F. Coordinate bus-assembly terminations to equipment enclosures to ensure proper phasing, connection, and closure.
- G. Tighten bus-assembly joints with torque wrench or similar tool recommended by bus-assembly manufacturer. Tighten joints again after bus assemblies have been energized for 30 days.
- H. Install bus-assembly, plug-in units. Support connecting conduit independent of plug-in unit.

### 3.2 CONNECTIONS

- A. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

- B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

### 3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
  - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- C. Remove and replace units that do not pass tests and inspections and retest as specified above.
- D. Infrared Scanning: Two months after Substantial Completion, perform an infrared scan of bus assembly including joints and plug-in units.
  - 1. Use an infrared-scanning device designed to measure temperature or detects significant deviations from normal values. Provide documentation of device calibration.
  - 2. Perform 1 follow-up infrared scans of bus assembly, at eleven (11) months after Substantial Completion.
  - 3. Prepare a certified report identifying bus assembly checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and scanning observations after remedial action.
- E. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.

### 3.4 ADJUSTING

- A. Set field-adjustable, circuit-breaker trip ranges and overload relay trip settings as indicated.

### 3.5 CLEANING

- A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.



3.6 PROTECTION

- A. Provide final protection to ensure that moisture does not enter bus assembly.

END OF SECTION 262500