Section 262400 - SWITCHBOARDS

1. GENERAL
   * + 1. SUMMARY
          1. This Section includes general requirements for electrical installations.
       2. SUBMITTALS
          1. Section Includes:

Distribution Switchboards.

Lighting and appliance branch-circuit Switchboards.

* + - * 1. No apparatus or equipment shall be shipped or fabricated until submittal documents for same have been reviewed and returned, “no exceptions taken” or “make corrections noted”.
        2. Products List: Include the following:

Manufacturer’s name and address.

Catalog designation or model number.

Equipment schedule number (cross referenced from drawings).

Rough-in data and dimensions.

Detailed drawings, including manufacturers catalog numbers showing all components.

* + - 1. DEFINITIONS
         1. ATS: Acceptance testing specification.
         2. GFCI: Ground-fault circuit interrupter.
         3. GFEP: Ground-fault equipment protection.
         4. HID: High-intensity discharge.
         5. MCCB: Molded-case circuit breaker
         6. SPD: Surge protective device.
         7. VPR: Voltage protection rating
      2. ACTION SUBMITTALS
         1. Product Data: For each type of Switchboard.

Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.

Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

* + - * 1. Shop Drawings: For each Switchboard and related equipment.

Include dimensioned plans, elevations, sections, and detail.

Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.

Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.

Detail bus configuration, current, and voltage ratings.

Short-circuit current rating of Switchboards and overcurrent protective devices.

Include evidence of NRTL listing for series rating of installed devices.

Include evidence of NRTL listing for SPD as installed in Switchboard.

Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

Include wiring diagrams for power, signal, and control wiring.

* + - 1. INFORMATIONAL SUBMITTALS
         1. Qualification Data: For testing agency.
         2. Switchboard Schedules: For installation in Switchboards.
      2. CLOSEOUT SUBMITTALS
         1. Operation and Maintenance Data: For Switchboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01700 "Project Closeout" include the following:

Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

* + - * 1. Outlets or equipment shown on the Drawings with no indication shall be completed in the same method and manner as similar outlets or equipment shown on the Drawings.
        2. The Contractor shall follow the Contract Documents in laying out the work, to become familiar with all conditions affecting the work and shall verify all spaces in which the work will be installed.
        3. Where job conditions require reasonable changes in indicated locations or arrangements, make changes without additional cost to the Owner.
        4. The Contract Documents and Specifications are to be cooperative and whatever is called for by either shall be binding as if called for by both.
      1. MAINTENANCE MATERIAL SUBMITTALs
         1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

Keys: Two spares for each type of Switchboard cabinet lock.

* + - 1. QUALITY ASSURANCE
         1. Manufacturer Qualifications: ISO 9001 or 9002 certified.
      2. DELIVERY, STORAGE, AND HANDLING
         1. Handle and prepare Switchboards for installation according to NEMA PB 1.
      3. FIELD CONDITIONS
         1. Environmental Limitations:

Do not deliver or install Switchboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above Switchboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

Rate equipment for continuous operation under the following conditions unless otherwise indicated:

Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F.

Altitude: Not exceeding 6600 feet.

* + - * 1. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

Notify Construction Manager no fewer than five (5) days in advance of proposed interruption of electricity.

Do not proceed with interruption of electric service without Construction Manager's written permission.

Comply with NFPA 70E.

* + - 1. WARRANTY
         1. Manufacturer's Warranty: Manufacturer agrees to repair or replace Switchboards that fail in materials or workmanship within specified warranty period.

Switchboard Warranty Period: 18 months from date of Substantial Completion.

* + - * 1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace SPD that fails in materials or workmanship within specified warranty period.

SPD Warranty Period: Five years from date of Substantial Completion

1. PRODUCTS
   * + 1. SWITCHBOARD COMMON REQUIREMENTS
          1. Fabricate and test Switchboards according to IEEE 344 to withstand seismic forces defined in Section 260548.16 "Seismic Controls for Electrical Systems.”
          2. Product Selection for Restricted Space: Drawings indicate maximum dimensions for Switchboards including clearances between Switchboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
          3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
          4. Comply with NEMA PB 1.
          5. Comply with NFPA 70.
          6. Enclosures: Flush and Surface-mounted, dead-front cabinets.

Rated for environmental conditions at installed location.

Indoor Dry and Clean Locations: NEMA 250, Type 1.

Height: 84 inches maximum.

Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.

Finishes:

Panels and Trim: galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.

Back Boxes: Galvanized steel.

* + - * 1. Incoming Mains:

Location: Convertible between top and bottom.

Main Breaker: Main 600 amperes.

* + - * 1. Phase, Neutral, and Ground Buses:

Material: Hard-drawn copper, 98 percent conductivity.

Plating shall run entire length of bus.

Bus shall be fully rated the entire length.

Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.

Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.

* + - * 1. Conductor Connectors: Suitable for use with conductor material and sizes

Material: Tin-plated aluminum.

Terminations shall allow use of 75 deg C rated conductors without derating.

Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.

Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the Switchboard.

Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the Switchboard.

Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

* + - * 1. NRTL Label: Switchboards shall be labeled by an NRTL acceptable to the Authority Having Jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Switchboards or load centers shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.
        2. Switchboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity. Switchboard ratings are shown on the Drawing Panel Schedule.
      1. PERFORMANCE REQUIREMENTS
         1. Seismic Performance: Switchboards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified”

* + - * 1. Surge Suppression: Factory installed as an integral part of indicated Switchboards, complying with UL 1449 SPD Type 2.
      1. SWITCHBOARDS
         1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=11316) Subject to compliance with requirements, provide products by one of the following:

[Eaton](http://www.specagent.com/Lookup?uid=123456977377).

[General Electric Company; GE Energy Management - Electrical Distribution](http://www.specagent.com/Lookup?uid=123456977378).

[Siemens Energy](http://www.specagent.com/Lookup?uid=123456977379).

[Square D; by Schneider Electric](http://www.specagent.com/Lookup?uid=123456977380).

* + - * 1. Switchboard: NEMA PB 1, distribution type.
        2. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

For doors more than 36 inches high, provide two latches, keyed alike.

* + - * 1. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Plug-in or Bolt-on circuit breakers.
        2. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
      1. DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES
         1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2047) Subject to compliance with requirements, provide products by one of the following:

[Eaton](http://www.specagent.com/Lookup?uid=123456977377).

[General Electric Company; GE Energy Management - Electrical Distribution](http://www.specagent.com/Lookup?uid=123456977378).

[Siemens Energy](http://www.specagent.com/Lookup?uid=123456977379).

[Square D; by Schneider Electric](http://www.specagent.com/Lookup?uid=123456977380).

* + - * 1. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

Thermal-Magnetic Circuit Breakers:

Inverse time-current element for low-level overloads.

Instantaneous magnetic trip element for short circuits.

Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

MCCB Features and Accessories:

Standard frame sizes, trip ratings, and number of poles.

Breaker handle indicates tripped status.

UL listed for reverse connection without restrictive line or load ratings.

Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.

Multipole units enclosed in a single housing with a single handle.

Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.

Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

* + - 1. DENTIFICATION
         1. Switchboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the Switchboard door.
         2. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.
         3. Circuit Directory: Computer-generated circuit directory mounted inside Switchboard door with transparent plastic protective cover.

Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

1. EXECUTION.
   * + 1. EXAMINATION
          1. Verify actual conditions with field measurements prior to ordering Switchboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.
          2. Receive, inspect, handle, and store Switchboards according to NEMA PB 1.1.
          3. Examine Switchboards before installation. Reject Switchboards that are damaged, rusted, or have been subjected to water saturation.
          4. Examine elements and surfaces to receive Switchboards for compliance with installation tolerances and other conditions affecting performance of the Work.
          5. Proceed with installation only after unsatisfactory conditions have been corrected.
       2. INSTALLATION
          1. Coordinate layout and installation of Switchboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
          2. Comply with NECA 1.
          3. Install Switchboard and accessories according to NEMA PB 1.1.
          4. Equipment Mounting:

Attach Switchboard to the vertical finished or structural surface behind the Switchboard.

* + - * 1. Mount Switchboard cabinet plumb and rigid without distortion of box.
        2. Mount top of trim 80 inches above finished floor unless otherwise indicated.
        3. Mount recessed Switchboards with fronts uniformly flush with wall finish and mating with back box.
        4. Install overcurrent protective devices and controllers not already factory installed.

Set field-adjustable, circuit-breaker trip ranges.

Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

* + - * 1. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
        2. Install filler plates in unused spaces.
        3. Stub four 1-inch empty conduits from recessed Switchboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.
      1. IDENTIFICATION
         1. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems.”
         2. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside Switchboard door.
         3. Switchboard Nameplates: Label each Switchboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems.”
         4. Device Nameplates: Label each branch circuit device in power Switchboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems.”
         5. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.
      2. ADJUSTING
         1. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.
         2. Set field-adjustable circuit-breaker trip ranges as indicated.

END OF SECTION 262400