

CONSTRUCTION STANDARD SPECIFICATION

SECTION 16440

ELECTRICAL PANELBOARDS

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CONSTRUCTION STANDARD SPECIFICATION

SECTION 16440

ELECTRICAL PANELBOARDS

PART 1 - GENERAL

1.01 SUMMARY

This Section describes lighting & appliance and power panelboards rated at 600 volts or less and 1200 amperes or less.

1.02 REFERENCES

A. Related Sections: Refer to the following Sections for related work.

1. Division 1, Section 01330, "Submittal Procedures."
2. Division 9, Section 09900, "Painting."
3. Division 16, Section 16001, "Electrical Work."
4. Division 16, Section 16995, "Electrical Commissioning."

B. Related Drawings: Refer to Standard Drawing E-0006STD, "Standard Symbols List and General Notes" for panelboard identification requirements.

C. National Electrical Manufacturers Association (NEMA)

AB 1 Molded Case Circuit Breakers

PB 1 Panelboards

PB 1.1 General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less

250 Enclosures for Electrical Equipment (1000 Volts Maximum)

D. Underwriters Laboratories, Inc. (UL)

50 Cabinets and Boxes

67 Panelboards

486 A Wire Connectors and Soldering Lugs for Use With Copper Conductors

489 Circuit Breakers, Molded-Case, and Circuit-Breaker Enclosures

1.03 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1, Section 01330 "Submittal Procedures."
- B. Product data for each type of panelboard, accessory item, and component specified.
- C. Shop Drawings; include the following for all panelboards:
 - 1. Manufacturer type, style & model number as applicable.
 - 2. Voltage, phase, and current rating, and neutral if required.
 - 3. Short-circuit current rating of panelboard.
 - 4. Main circuit breaker size & type, or main lugs only and location.
 - 5. Tabulation of all branch circuit breakers including type, size, location in panelboard and circuit numbering.
 - 6. Enclosure dimensions.
 - 7. Enclosure side gutter dimensions (reference 2.03 E.)
 - 8. All modifications and additional equipment, including but not limited to: Copper bus, ground bus bonded to box, circuit breaker locking devices, door-in-door cover, & UL Service Entrance Label as required.

1.04 QUALITY ASSURANCE

- A. All panelboards shall be designed, manufactured and assembled in accordance with the referenced standards.
- B. Listing and Labeling: All panelboards shall listed and labeled by Underwriter's Laboratories, Inc. (UL), or other nationally-recognized testing laboratory (NRTL).
- C. Service Entrance panelboards shall be UL/NRTL-labeled as suitable for that purpose.
- D. Single-source Responsibility: Provide panelboards products that are new, and from the same manufacturer for each building or job. Panelboard components shall be from the same manufacturer, or listed as an assembly thereof.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Panelboards shall be provided from the following approved manufacturers:
 - 1. Eaton/Cutler-Hammer.
 - 2. Siemens.
 - 3. Square D.

- B. Panelboards other than from the above listed manufacturers will require a special specification and prior approval from SNL.

2.02 GENERAL

- A. Voltage and current rating, as indicated on Panel Schedules.
- B. Ampere interrupting capacity (AIC) as indicated on panel schedules. Series AIC ratings are not acceptable.
- C. Main circuit breaker (MCB) or main lug only (MLO) as indicated on panel schedules. Double or dual main lugs or subfeed lugs are not acceptable.
- D. Panelboards shall be in a single enclosure. Two-section panels are not acceptable.
- E. Provide panelboards with size and number of single, double, or three-pole circuit breakers as indicated on panel schedules. When multi-pole breakers are scheduled with no further qualifications, provide same with a single operating handle. When multi-pole breakers are specifically called out as handle-tied single-pole breakers, provide same listed for such use. Single-handle multi-pole breakers shall not be substituted for handle-tie requirements.
- F. Arrange and number circuit breakers exactly as shown on drawings and panel schedules. Single-branch mounted or subfeed breakers are not acceptable.
- G. Where the word “space” occurs on panel schedules, provide all necessary hardware in the space, including connection straps, mounting brackets, and filler plates so that only the addition of a future circuit breaker is required. Connection straps shall be rated a minimum of 100A in panelboards of 400A rating or less and a minimum of 225A in panelboards above 400A rating, unless otherwise noted on panel schedules.
- H. Provide Micarta buttons, small window-frame, or permanent strip type identification labels on interior trim to identify circuit number. Do not use adhesive-backed fabric or paper labels alone.

2.03 ENCLOSURES

- A. Shall be NEMA type enclosure as indicated on panel schedules.
- B. Provide flush or surface cover, as indicated on panel schedules.
- C. Front cover shall be factory manufactured, UL/NRTL listed, one-piece, hinged “door-in-door” type with:
 1. Interior hinged door with hand-operated latch or latches as required to provide access to circuit breaker operating handles only; not to energized parts.
 2. Outer hinged door to provide access to the entire enclosure including deadfront and all wiring gutters.
 3. Outer door shall be securely mounted to the panelboard box with factory bolts, screws, clips or other fasteners requiring a tool for entry; hand operated latches are not acceptable.

4. Both inner and outer doors shall be hinged on the right to open left to right.
- D. Include one-piece, removable, inner deadfront cover, independent of the panelboard cover.
- E. Provide enclosure with the following side gutter dimensions:
 1. Left side minimum 4-1/2" measured from inside lip of the box to the installed deadfront.
 2. Right side; minimum 4-1/2" measured from inside lip of the box to the installed deadfront. With the door-in-door cover in place; minimum 3-1/4" from installed outer door hinge to the installed deadfront.
- F. Prepare, prime, and paint front trim cover with light gray enamel electro-deposited over phosphatized steel, or baked-on polyester coating.

2.04 BUS

- A. Phase buses shall be hard-drawn 98 percent conductivity copper.
- B. Neutral Bus:
 1. Shall be hard-drawn 98 percent conductivity copper.
 2. Shall be 100% rated (current rating same as phase buses).
 3. Shall provide a screw terminal for each breaker position, in addition to the feeder neutral lug.
- C. Grounding Bus:
 1. Shall be hard-drawn 98 percent conductivity copper.
 2. Shall be factory-installed, bonded to enclosure.
 2. Shall provide a screw terminal for each breaker position, in addition to the feeder grounding conductor lug.

2.05 CIRCUIT BREAKERS

- A. General: Provide circuit breakers as integral components of panelboard with indicated features, ratings, characteristics, and settings.
- B. Mounting: Each circuit breaker shall be bolted into position in the panelboard, whether by direct bolted connection to the bus or by being bolted to the panelboard frame. Each circuit breaker shall be replaceable without disturbing adjacent units. Plug-on circuit breakers held in place only by spring force of the bus lug and the pressure of the deadfront are not acceptable.
- C. Molded-Case Circuit Breakers:
 1. Characteristics: Frame size, trip rating, voltage, frequency, number of poles, and short-circuit interrupting capacity rating as indicated on panel schedules.

2. Tripping Device: Quick-make, quick-break toggle mechanism with inverse-time delay and instantaneous overcurrent trip protection for each pole.
 - a. Multi-pole molded-case circuit breakers shall include common internal tripping of all poles.
 - b. Circuit breakers with “handle-ties” are not acceptable.
 - c. Half-size circuit breakers with two circuits occupying a single position on the same phase bus are not acceptable.
3. Terminal Lugs: Provide load side of circuit breaker with front-connected UL-listed lugs for copper cable at full frame rating. Provide terminals rated for minimum 75 degrees C.
4. All single-pole circuit breakers shall be switching duty rated.
5. All multi-pole circuit breakers shall be HACR duty rated.
6. Provide factory-installed circuit breaker handle padlocking devices on all multi-pole circuit breakers.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

- A. Furnish labor, materials, services, equipment, supplies, and perform operations necessary to install complete, functional electrical panelboards in accordance with this Section, drawings, panel schedules and manufacturers’ instructions.
- B. Wiring shall be trained neatly in wiring gutters. Form wiring to right angles at circuit breaker connections.
- C. Panelboard Identification: Refer to Standard Drawing E-0006STD.
- D. Conductor Identification: All conductors in panel shall be tagged, including neutral and ground conductors.
 1. Tags shall indicate circuit number.
 2. Install a Brady slip on label on conductors sized less than # 6 AWG and install a Panduit #MP-350C tag and tie-wrap for conductors sized # 6 AWG or larger.
 3. Use a Panduit marking pen PX-O or a Sharpie permanent marker for labels.
- E. Provide panel schedule holder: C-Line Products No. 70912 or equal self-adhesive clear heavy vinyl shop ticket holder, size 9” X 12” mounted on the inside of the panelboard interior door. Install two copies of a completely filled out, as-built SNL Microsoft Excel format 8-1/2” X 11” panel schedule.

3.02 MOUNTING

- A. Mount panelboards plumb and rigid without distortion of box.

- B. Arrange flush panels so that enclosure front surface is uniformly flush with wall, and exterior door covers wall to enclosure mating surfaces.
- C. Mount panelboards so that distance from floor to center of top panel does not exceed 6'-6" unless otherwise noted on Drawings.
- D. Grind smooth corners, and file or grind smooth edges of metal angles, channels, straps, and other similar items to be used to support electrical panelboards. Paint to match panelboards, per requirements of Section 09900, "Painting".

- END OF SECTION 16440 -