

**SECTION 26 24 16
PANEL BOARDS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Service and distribution panel boards
- B. Lighting and appliance branch circuit panel boards

1.2 REFERENCES

- A. FS W-C -375 - Circuit Breakers, Molded Case, Branch Circuit and Service
- B. FS W-P -115 – Panel, Power Distribution
- C. UL 489 - Molded Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
- D. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches
- E. NEMA PB 1 - Panelboards
- F. NEMA PB 1.1 – General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or less
- G. NEMA PB 2.2 - Application Guide for Ground-Fault Protective (GFP) Devices for Equipment

1.3 SUBMITTALS

- A. Submit shop drawings for equipment and component devices under provisions of Section 01 33 00.
- B. Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

1.4 COMMISSIONING

- A. Commissioning of a system or systems specified in this section is part of the construction process.
- B. Documentation and testing of these systems, as well as training of the Owner's operation and maintenance personnel, is required in cooperation with the Owner's Representative and the Commissioning Authority.
- C. Project Closeout is dependent on successful completion of all commissioning procedures, documentation, and issue closure.
- D. Refer to Section 01 77 00 - Contract Closeout, for substantial completion details.
- E. Refer to Section 01 91 00 - Commissioning, for detailed commissioning requirements.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURES - PANELBOARDS

- A. Square D
- B. General Electric
- C. Cutler Hammer
- D. Siemens/ITE

2.2 MAIN AND DISTRIBUTION PANELBOARDS

- A. Panel boards: Use a NEMA PB 1 circuit breaker type fusible switch type.
- B. Enclosure: NEMA PB 1 type as required to meet conditions of installation unless indicated on the Drawings.
- C. Provide flush lock in hinged door(s).
 - 1. Covers finished in manufacturer's standard enamel color.
- D. Provide panel boards with copper bus, ratings as scheduled on Drawings.
 - 1. Provide copper ground bus in all panel boards.
- E. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical for 208 volt panel boards; 14,000 amperes rms symmetrical for 480 volt panel boards, or as shown on Drawings.
- F. Fusible Switch Assemblies:

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Project Name:

SDPBC Project No.:

1. NEMA KS 1 quick-make quick-break load interrupter enclosed knife switch with externally operable handle.
 2. Provide interlock to prevent opening front cover with switch in ON position.
 3. Handle lockable in OFF position.
 4. Fuse Clips: Designed to accommodate Class R fuses, type as specified.
 - G. Molded Case Circuit Breakers: Provide UL 489 circuit breakers with integral thermal and instantaneous magnetic trip in each pole.
 1. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.
 - H. Molded Case Circuit Breakers with Current Limiters: Provide UL 489, circuit breakers with replaceable current limiting elements, in add provide an integral thermal and instantaneous magnetic trip in each pole.
 - I. Current Limiting Molded Case Circuit Breakers; UL 489; provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinate with automatically resetting current limiting elements in each pole.
 1. Interrupting rating of 100,000 symmetrical amperes, let-through current, and energy level less than permitted for same size Class RK-5 fuse.
 - J. Breakers to have bolted bus connections
- 2.3 BRANCH CIRCUIT PANELBOARDS
- A. Lighting and Appliance Branch Circuit Panel boards, provide NEMA PB1 circuit breaker type.
 - B. Enclosure: Use a NEMA PB 1 Type 1 or Type 3R.
 - C. Provide applicable cabinet front with concealed trim clamps, concealed hinge, and flush lock all keyed alike.
 1. Finish in manufacturer's standard enamel.
 - D. Provide panel boards with copper bus, ratings as scheduled on Drawings.
 1. Provide copper ground bus in all panel boards.
 - E. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical for 208 volt panel boards; 14,000 amperes rms symmetrical for 480 volt panel boards, or as shown on Drawings.
 - F. Molded Case Circuit Breakers: UL 489 bolt on type thermal magnetic trip circuit breakers, with common trip handle for all poles.
 - G. Current Limiting Molded Case Circuit Breakers:
 1. UL 489; provide bolt-on type circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole.
 2. Interrupting rating of 100,000 symmetrical amperes let-through current and energy level less than permitted for same size Class RK-5 fuse.
 - H. Do not use tandem circuit breakers.
 - I. Use full width, breakers.
 - J. Breakers for kitchen equipment shall have permanent padlock breaker locks.
 - K. Provide a neutral conductor to every panel board.
- 2.4 ALTERNATIVE SYSTEM
- A. Panelboards combined with integrated power distribution system containing switchboard, panelboards, transformers, transient voltage surge-suppression devices (TVSS), and other electrical equipment will be acceptable.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install panel boards plumb and flush with wall finishes where recessed, in conformance with NEMA PB 2.1.
- B. Height: 6' maximum
- C. Provide filler plates for unused spaces in panel boards.
- D. Provide typed circuit directory for each branch-circuit panel board.
 - 1. Revise directory to reflect circuiting changes required to balance phase loads.
- E. Provide two - 1" spare conduits from recessed and one - 1" spare conduit from surface panel boards into the closest suspended acoustical ceiling outside the room where the panel is located.
- F. Install surface-mounted panel boards with minimum of four anchors.
 - 1. Provide steel channel supports to stand panel boards $\frac{3}{4}$ " off wall.
- G. Bridge studs top and bottom with channels to support flush-mounted panel boards in stud walls.

3.2 FIELD QUALITY CONTROL

- A. Measure steady state load currents at each panel board feeder.
 - 1. Should the difference at any panel board between phases exceed 15%, rearrange circuits in the panel board to balance the phase loads within 15%.
 - 2. Take care to maintain proper phasing for multi-wire branch circuits.
- B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding.
 - 1. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

3.3 FUNCTIONAL PERFORMANCE TESTING

- A. System Functional Performance Testing is part of the Commissioning Process.
 - 1. The Contractor shall perform the Functional Performance Testing and the Commissioning Authority shall witness and document the test.
 - 2. Refer to Section 01 91 00, Commissioning, for functional performance tests and commissioning requirements.
- B. Systems Readiness Checklists shall be completed and submitted for each piece of equipment included in this section.
- C. Perform the Functional performance testing of Panelboards as part of the Electrical System Functional Performance testing.

3.4 DEMONSTRATION AND TRAINING

- A. Training of the Owner's operation and maintenance personnel is required in cooperation with the Owner's Representative.
 - 1. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems.
 - 2. Schedule the instruction in coordination with the Owner's Representative after submission and approval of formal training plans.
 - 3. Refer to Section 01 91 00, Commissioning, for further contractor training requirements
- B. Provide demonstration and training for all types of panelboards installed in this project.

END OF SECTION