

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Distribution panelboards.
2. Branch circuit panelboards.

B. Related Requirements:

1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
2. Section 26 05 53 - Identification for Electrical Systems.
3. Section 26 28 13 - Fuses.

1.02 REFERENCE STANDARDS

A. Institute of Electrical and Electronics Engineers:

1. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

B. National Electrical Manufacturers Association:

1. NEMA FU 1 - Low Voltage Cartridge Fuses.
2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
3. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
4. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
5. NEMA PB 1 - Panelboards.
6. NEMA PB 1.1 - General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.

C. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

D. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.

- E. Underwriters Laboratories Inc.:
 - 1. UL 50 - Cabinets and Boxes
 - 2. UL 67 - Safety for Panelboards.
 - 3. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.
 - 4. UL 1283 - Electromagnetic Interference Filters.
 - 5. UL 1449 - Transient Voltage Surge Suppressors.
 - 6. UL 1699 - Arc-Fault Circuit Interrupters.

1.03 SUBMITTALS

- A. Division 01 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit catalog data showing specified features of standard products.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
- D. Source Quality control submittals: Indicate results of factory tests and inspections.
- E. Field Quality Control Submittals: Indicate results of Contractor furnished tests and inspections.

1.04 CLOSEOUT SUBMITTALS

- A. Division 01 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements.
- C. Operation and Maintenance Data: Submit spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.05 MAINTENANCE MATERIAL SUBMITTALS

- A. Division 01 - Execution and Closeout Requirements: Requirements for maintenance products.
- B. Extra Stock Materials:
 - 1. Furnish two (2) of each panelboard key. Panelboards keyed alike to Owner's current keying system.

1.06 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Dead-front panelboards incorporating the number, rating and type of circuit over-current protection indicated and as shown on the Contract Drawings shall be provided in the enclosure specified for either surface or flush mounting as indicated on the Drawings.

2.02 MANUFACTURERS

- A. Subject to the requirements of this specification, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
 - 1. Schneider Electric/Square D.
 - 2. General Electric Company.
 - 3. Siemens.
 - 4. Eaton Corporation/Cutler-Hammer
 - 5. Approved Equal.

2.03 DISTRIBUTION PANELBOARDS – CIRCUIT BREAKER TYPE

- A. Description: NEMA PB 1, circuit breaker type distribution panelboard.
- B. All interiors shall be completely factory assembled with switching and protective devices, connectors, etc. They shall be so designed that switching and protective devices can be replaced without disturbing adjacent units, without removing the main bus connectors, and shall be so designed that circuits may be changed without machining, drilling or tapping.
- C. Short Circuit Rating:
 - 1. For 208 volt panels - 35,000 amperes RMS symmetrical.
 - 2. For 480 volt panelboards - 65,000 amperes RMS symmetrical.
 - 3. As indicated on the Drawings.
- D. Materials:
 - 1. Panelboard Bus: Copper, current carrying components, ratings as indicated on Drawings. Furnish isolated copper neutral bus in each 4-wire panelboard. Furnish copper ground bus in each panelboard.
 - 2. Multiple cable lugs for incoming feeder cables shall be furnished where required. Lugs shall be secured to bus by stud bolts. Multiple section panels shall have sub-feed or feed-through lugs with full capacity taps to adjacent panel section.
 - 3. Molded Case Circuit Breakers: UL 489, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Furnish circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.

4. Current Limiting Molded Case Circuit Breakers: UL 489, circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole. Interrupting rating 65,000 symmetrical amperes, let-through current and energy level less than permitted for same size NEMA FU 1, Class RK-5 fuse.
 5. Circuit breakers shall be bolted in type, consisting of the number of poles and ampere ratings as noted on the drawings. Two and three pole breakers shall be of the common trip type.
 6. Provide circuit breaker accessory trip units and auxiliary switches as indicated.
 7. All distribution panelboard circuit breakers shall be equipped with lock-out/tag-out devices.
 8. Surge Suppressers: Integrated in panelboard, factory mounted. Provide surge suppressor for every distribution panelboard.
 9. Enclosure: NEMA PB 1, Type 1. Box shall be fabricated from code gauge galvanized sheet steel without pre-punched knockouts.
 10. Cabinet Front: Surface door-in-door type, fastened with screws.
- E. Finishes
1. Manufacturer's standard gray enamel.
- F. Circuit Breaker Distribution Panelboards shall be equal to Eaton Pow-R-Line.

2.04 BRANCH CIRCUIT PANELBOARDS

- A. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.
- B. All interiors shall be completely factory assembled with switching and protective devices, connectors, etc. They shall be so designed that switching and protective devices can be replaced without disturbing adjacent units, without removing the main bus connectors, and shall be so designed that circuits may be changed without machining, drilling or tapping.
- C. Short Circuit Rating:
1. For 240 volt panelboards - 22,000 amperes RMS symmetrical.
 2. For 480 or 480/277 volt panelboards - 35,000 amperes RMS symmetrical.
 3. As indicated on Drawings.
- D. Materials:
1. Panelboard Bus: Copper, current carrying components, ratings as indicated on Drawings. Furnish an insulated copper neutral bus in each panelboard with a neutral.
 2. Furnish copper ground bus in each panelboard. Furnish insulated ground bus as indicated on Drawings. Ground bus shall be bare, un-insulated and

suitably bolted to the cabinet. Provide suitable lugs for each feeder ground conductor and each outgoing branch or feeder circuit.

3. Multiple cable lugs for incoming feeder cables shall be furnished where required. Lugs shall be secured to bus by stud bolts. Multiple section panels shall have sub-feed or feed-through lugs with full capacity taps to adjacent panel section.
4. Molded Case Circuit Breakers: UL 489, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits; Type HACR for air conditioning equipment circuits; Class A ground fault interrupter circuit breakers as indicated on Drawings. Provide UL Class 760 arc-fault interrupter circuit breakers as indicated on Drawings. Do not use tandem circuit breakers.
5. Enclosure: NEMA PB 1, Type.
6. Cabinet Box: 6 inches (153 mm) deep, 20 inches (508 mm) unless otherwise noted. Box shall be fabricated from code gauge galvanized sheet steel without pre-punched knockouts.
- E. Cabinet Front: Surface cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock keyed alike.
- F. Finishes: Finish in manufacturer's standard gray enamel.
- G. Branch Circuit panelboards shall be Eaton Type Pow-R-Line 1a, or approved equal for 208/120 volts. Circuit breakers shall be Eaton Type QBHW, or approved equal.
- H. Lighting Panelboards shall be Eaton Type Pow-R-Line 2a, or approved equal for 480/277 volts. Circuit breakers shall be Eaton Type GHB or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install panelboards in accordance with NEMA PB 1.1.
- B. Install panelboards plumb.
- C. Install recessed panelboards flush with wall finishes.
- D. Height: 6-feet 6-inches to operating handle of highest circuit breaker. Install panelboards not less than 6-inches above the floor.
- E. Install filler plates for unused spaces in panelboards.
- F. Provide type circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes to balance phase loads. Identify each circuit as to its clear, evident and specific purpose of use.
- G. Install engraved plastic nameplates in accordance with Section 26 05 53.
- H. Install three (3) 1" spare conduits out of each recessed panelboard to accessible location above ceiling. Identify each as SPARE.

- I. Ground and bond panelboard enclosure according to Section 26 05 26. Connect equipment ground bars of panels in accordance with NFPA 70.

3.02 FIELD QUALITY CONTROL

- A. Division 01 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform circuit breaker inspections and tests listed in NETA ATS, Section 7.6.
- D. Perform switch inspections and tests listed in NETA ATS, Section 7.5.
- E. Perform controller inspections and tests listed in NETA ATS, Section 7.16.1.

3.03 ADJUSTING

- A. Division 01 - Execution and Closeout Requirements: Requirements for starting and adjusting.
- B. Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

3.04 CLEANING

- A. Division 01 - Execution and Closeout Requirements: Requirements for cleaning.

END OF SECTION