

**SECTION 262816**  
**ENCLOSED SWITCHES AND CIRCUIT BREAKERS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes:
  - 1. Disconnect switches and fuses, rated 600 volts and less, as specified and indicated.
  - 2. Enclosed, molded-case, circuit breakers, rated 600 volts and less and 200 amperes and less, as specified and indicated.

**1.3 REFERENCES**

- A. National Electrical Manufacturers Association (NEMA).
  - 1. AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
  - 2. KS 1 - Enclosed Switches.
- B. Underwriters Laboratories Inc.
  - 1. 98 - Enclosed and Dead-Front Switches.
  - 2. 198C - High-Interrupting-Capacity Fuses, Current-Limiting Types.
  - 3. 198E - Class R Fuses.
  - 4. 489 - Molded-Case Circuit Breakers and Circuit-Breaker Enclosures.
  - 5. 512 - Fuseholders.

**1.4 SUBMITTALS**

- A. Product Data: Submit manufacturer's technical product data for each type of disconnect switch and fuse provided.
- B. Shop Drawings: Submit dimensioned drawing showing exterior view of disconnect switch and internal equipment arrangement.

**1.5 QUALITY ASSURANCE**

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. 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.
- D. Comply with NFPA 70.

## **1.6 MAINTENANCE**

- A. Extra Materials:
  - 1. Provide one set of three spare replacement fuses for each size and voltage of Class L fuse provided.
  - 2. Provide set of three spare replacement fuses for each size and voltage of class RK1 and RK5 fuse provided, on the basis of one spare set for every ten sets of fuses provided, but in no case less than one set of spares.
- B. Fuse Cabinet: Provide fuse cabinet(s) as needed to house all spare fuses provided. Mount cabinets as indicated.

## **PART 2 - PRODUCTS**

### **2.1 CIRCUIT BREAKER**

- A. Manufacturers:
  - 1. Cutler-Hammer
  - 2. GE Industrial Systems
  - 3. Siemens Energy & Automation, Inc.
  - 4. Square D.
  - 5. Eaton
- B. Circuit Breakers:
  - 1. Inverse time automatic tripping circuit breaker per NEMA AB 1 and UL 489. Provide adjustable magnetic trip for frame sizes 250A and larger.
  - 2. Provide voltage rating as required for indicated circuit application with number of poles and amperes rating as indicated.
  - 3. Provide following circuit breaker accessories where indicated on plans.
    - a. Shunt trip device with 120-volt control.
    - b. Undervoltage trip device.
    - c. Ground fault circuit interrupter, GFCI, Class A, 5mA trip.
    - d. Ground fault equipment protection, GFEP, Class B, 30mA trip.
  - 4. Provide handle capable of being locked in the open position with padlock.
  - 5. Provide NEMA 1 enclosure unless otherwise indicated. Provide corrosion-resistant primer treatment and light gray baked acrylic enamel finish.

### **2.2 DISCONNECT SWITCHES**

- A. Manufacturers:
  - 1. Cutler-Hammer.
  - 2. GE Industrial Systems.
  - 3. Siemens Energy & Automation, Inc.
  - 4. Square D.

B. Disconnect Switches:

1. Quick-make, quick-break, horsepower rated NEMA type HD load interrupter enclosed knife switch, per NEMA KS 1 and UL 98, with externally operable handle interlocked to prevent opening front cover with switch in "on" position. Provide bypass means to allow authorized personnel to release the interlocking when the switch is "on"
2. Provide operating handle which physically indicates "on" and "off" positions and is capable of being padlocked in the "off" position.
3. Provide NEMA 1 enclosure unless otherwise indicated. Provide corrosion-resistant primer treatment and light gray baked acrylic enamel finish.
4. Provide fusible switch with fuseholders and fuses unless a non-fusible switch is indicated. Provide Class R rejection-type fuseholders complying with UL 512.
5. Provide 240 or 600-volt switch as required for application indicated, three-pole unless indicated otherwise with amperes rating indicated.

## 2.3 FUSES

A. Manufacturers:

1. Bussmann Div., Cooper Industries Inc.
2. Ferraz Shawmut.
3. Brush Inc.
4. Littelfuse Inc.

B. Fuses:

1. Provide fuses from the same manufacturer to insure retention of selective protective device coordination.
2. Fuses rated 600 amperes and less: UL Class RK1 unless otherwise indicated or specified, current-limiting, time-delay, per UL 198E, with an interrupting rating of 100,000 amperes rms.
  - a. Provide UL Class RK5 fuses current-limiting, time-delay, per UL 198E, with an interrupting rating of 100,000 amperes rms, as follows:
    - 1) Motor starters size 3 and smaller.
    - 2) Panelboard main fuses where the amperage ratio between the main fuse to the largest feeder fuse is at least 2:1.
3. Fuses rated greater than 600 amperes: UL Class L, current-limiting, per UL 198C, with an interrupting rating of 200,000 amperes RMS.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
  2. Outdoor Locations: NEMA 250, Type 3R.

3. Kitchen or Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
6. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7.

### **3.2 IDENTIFICATION**

- A. Provide engraved plastic-laminate sign, per related Division 26 sections of the Specifications, indicating the following lines of information:
  1. Designation, if indicated (e.g., "CB-1").
  2. Electrical characteristics (e.g., "480V, 3Ph, 3W, 60A").
  3. Load served (e.g., "Serves EF-1").
  4. Source feed (e.g., "Feed from DP-A").
- B. Label series rated equipment and identify replacement fuse catalog numbers.
- C. Fuses: Install fuses in fusible devices.
- D. Circuit Breakers and Disconnect Switches:
  1. Install circuit breakers and disconnect switches at locations indicated.
  2. Support enclosures independent of connecting conduit or raceway system.
  3. Adjust trip settings of enclosed circuit breaker.
  4. Install enclosures plumb and square to building lines.
  5. Install equipment on exterior foundation walls at least 1 inch from wall to permit vertical flow of air behind breaker and switch enclosures.

### **3.3 FIELD QUALITY CONTROL**

- A. Field Tests: Verify proper mechanical operation of enclosed circuit breakers and disconnect switches.

**END OF SECTION 262816**