

**SECTION 26 28 17**  
**ENCLOSED CIRCUIT BREAKERS**  
**PART 1 - GENERAL**

- 1.1 RELATED DOCUMENTS:
- A. The Conditions of the Contract and applicable requirements of Divisions 0 and 1 and Section 26 00 01, "Electrical General Provisions", govern this Section.
- 1.2 DESCRIPTION OF WORK:
- A. Work Included: Provide enclosed circuit breaker work as shown, scheduled, indicated, and as specified.
- 1.3 STANDARDS:
- A. Products shall be designed, manufactured, tested, and installed in compliance with the following standards:
1. Federal Spec. W-S-865 Switch, Box (Enclosed), Surface-Mounted.
  2. NEMA KS 1 Enclosed Switches.
- 1.4 QUALITY ASSURANCE:
- A. Manufacturers: Provide products complying with these specifications and produced by one of the following:
1. Cutler-Hammer, Inc.
  2. Eaton.
  3. General Electric Company.
  4. Siemens.
  5. Square D Company.
- B. UL-Label: Enclosed circuit breakers shall have Underwriters' Laboratories, Inc., approval and bear the UL label.
- C. Interrupting Ratings: Short circuit analysis and coordination study specified in Section 26 05 73 "Short Circuit Analysis/Coordination Study" shall be completed and submitted with switchboard submittal to confirm interrupting rating of submitted equipment is adequate for the point of application in the electrical distribution.
- 1.5 SUBMITTALS:
- A. Shop drawing submittals shall include, but not be limited to, the following:
1. Cut sheets of the enclosed circuit breakers with ratings, voltage, poles, capacity, horsepower, short circuit rating, and all associated accessories clearly indicated.
  2. Include dimensioned drawings of enclosed circuit breakers which have a rating of 225 amperes or larger, showing the accurately scaled enclosures and their layout, and relation to associated equipment.
  3. The Short Circuit Analysis, Protective Device Coordination Study[, **Emergency Power System Selective Coordination Study**] and Arc Flash and Electrical Hazard Studies specified in Section 26 05 73, "Short Circuit Analysis/Coordination Study" shall be completed and submitted prior to submitting submittals for this section.
  4. Additional information as required in Section 16002.

1.6 DELIVERY, STORAGE AND HANDLING:

- A. Deliver circuit breakers individually wrapped in factory-fabricated water-resistant type containers.
- B. Handle circuit breakers carefully to avoid damage to material components, enclosure and finish. Damaged switches shall not be installed on project.
- C. Store circuit breakers in a clean and dry space and protect from weather.

**PART 2 - PRODUCTS**

2.1 MOLDED CASE CIRCUIT BREAKERS:

- A. General: Provide enclosed, molded-case circuit breaker conforming to NEMA AB 1, suitable for use as service entrance equipment where so applied.

**[VERIFY THE FOLLOWING]**

- B. Solid-State Circuit Breakers: Enclosed circuit breakers **[400 ampere frame and above and all emergency power system distribution panel circuit breakers]** shall be equipped with solid-state programmable trip complete with built-in current transformers, solid-state trip unit and flux transfer shunt trip. The solid-state electronic programmable trip device shall have the following features and tripping functions.
  - 1. Adjustable current setting.
  - 2. Adjustable long-time delay.
  - 3. Adjustable instantaneous pick-up.
  - 4. Adjustable short time delay.
  - 5. Adjustable short time pick-up.
  - 6. **[Adjustable ground fault delay]**
  - 7. **[Adjustable ground fault pick-up]**
- C. Interrupting Capacity: Provide distribution panel circuit breakers with conventional interrupting capacity unless scheduled shown or noted otherwise, but in no case less than the following symmetrical amperes RMS:

<u>Frame Size/Voltage (volts)</u>	<u>Interrupting Capacity</u>
100AF to 225AF/240V	10,000 AIC
400AF to 1000AF/240V	42,000 AIC
1200AF/240V	100,000 AIC-
100AF/480V	18,000 AIC
225AF/480V	25,000 AIC
400AF to 1000AF/480V	30,000 AIC
1200AF/480V	50,000 AIC

- D. Accessories: As scheduled on drawings. Conform to NEMA AB 1.
  - 1. Shunt Trip Device: 120 volts, AC, where specified or noted.
  - 2. Undervoltage Trip Device: 120 volts, AC, where specified or noted.
  - 3. Auxiliary Switch: 120 volts, AC, where specified or noted.
  - 4. Alarm Switch: 120 volts, AC, where specified or noted..
  - 5. Electrical Operator: 120 volts, AC, where specified or noted.
  - 6. Handle Lock: Provisions for padlocking.
  - 7. Insulated Grounding Lug: In each enclosure.

- E. Enclosures: NEMA AB 1, as required to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel aluminum.
  - 1. Interior Dry Locations: NEMA Type 1
  - 2. Exterior Locations: NEMA Type 3R.
  - 3. Industrial Locations: NEMA Type 4X
- F. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Provide solid neutral assembly and equipment ground bar.

### **PART 3 - EXECUTION**

#### 3.1 INSPECTION:

- A. Installer shall examine the areas and conditions under which safety and disconnect switches are to be installed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION OF ENCLOSED CIRCUIT BREAKERS:

- A. General: Install enclosed circuit breakers where shown, in accordance with the manufacturer's written instructions, the applicable requirements of the NEC, the NECA's "Standard of Installation", and recognized industry practices to ensure that products serve the intended function.
- B. Location: Provide enclosed circuit breakers where shown and at each motor which is out-of-sight-of or greater than 50' from the switch or panel from which the motor circuit is fed, unless another NEC complying disconnecting method is utilized.
- C. Supports: Provide all enclosed circuit breakers with galvanized angle or other suitable supports where mounting on wall or other rigid surface is impractical. Switches shall not be supported by conduit alone. Where safety and disconnect switches are mounted on equipment served, the switch shall not inhibit removal of any service panels or interfere with any required access areas. Install enclosed circuit breakers plumb. Provide supports.
- D. Height: 5 feet to operating handle.

#### 3.3 ADJUSTING:

- A. Adjust trip settings so that circuit breakers coordinate with other overcurrent protective devices in circuit.
- B. Adjust trip settings to provide adequate protection from overcurrent and fault currents.

#### 3.4 TESTING:

- A. General: Prior to energization, check for continuity of circuits and for short circuits.

#### 3.5 IDENTIFICATION:

- A. Refer to Section 26 05 53, "Identification for Electrical Systems", for applicable painting, nameplates, and labeling requirements.

### **END OF SECTION 26 28 17**