

SECTION 16410

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. Section Includes
 - 1. Fusible switches
 - 2. Nonfusible switches
 - 3. Enclosures

1.3 DEFINITIONS

- A. NC: Normally closed
- B. NO: Normally open
- C. SPDT: Single pole, double throw

1.4 SUBMITTALS

- A. In accordance with Section 01340
- B. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes
 - 1. Enclosure types and details for types other than NEMA 250, Type 1
 - 2. Current and voltage ratings
 - 3. Short-circuit current ratings (interrupting and withstand, as appropriate)
 - 4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components
- C. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following
 - 1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers

2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device

1.5 QUALITY ASSURANCE

- A. 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
- B. Comply with NFPA 70

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated
 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F
 2. Altitude: Not exceeding 6600 feet

1.7 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels

1.8 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents
 1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type
 2. Fuse pullers: Two for each size and type

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following
 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit
 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric
- B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated

fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position

C. Accessories

1. Equipment ground kit: Internally mounted and labeled for copper and aluminum ground conductors
2. Neutral kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors
3. Class R fuse kit: Provides rejection of other fuse types when Class R fuses are specified
4. Lugs: Mechanical type, suitable for number, size, and conductor material
5. Service-rated switches: Labeled for use as service equipment

2.2 NONFUSIBLE SWITCHES

A. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position

C. Accessories

1. Equipment ground kit: Internally mounted and labeled for copper and aluminum ground conductors
2. Neutral kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors
3. Hookstick handle: Allows use of a hookstick to operate the handle
4. Lugs: Mechanical type, suitable for number, size, and conductor material

2.3 MOLDED-CASE CIRCUIT BREAKERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents

- C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger
- D. Features and Accessories
 - 1. Standard frame sizes, trip ratings, and number of poles
 - 2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material
 - 3. Application listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits

2.4 ENCLOSURES

- 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. Unless otherwise specified, enclosures shall be as follows
 - 1. Indoor, dry and clean locations: NEMA 250, Type 1
 - 2. Outdoor locations: NEMA 250, Type 3R
 - 3. 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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work
- B. Proceed with installation only after unsatisfactory conditions have been corrected

3.2 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components
- C. Install fuses in fusible devices
- D. Comply with NECA 1

3.3 IDENTIFICATION

- A. Comply with requirements in Section 16075
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate

3.4 FIELD QUALITY CONTROL

- A. Acceptance Testing Preparation
 - 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit
 - 2. Test continuity of each circuit
- B. Tests and Inspections
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest
 - 3. Perform the following infrared scan tests and inspections and prepare reports
 - a. Initial infrared scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner
 - b. Follow-up infrared scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion
 - c. Instruments and equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device
 - 4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment
- C. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections

3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer

END OF SECTION