Section 16410

Enclosed Circuit Breakers

PART 1: General

1.1 *Summary* – This Section includes the following individually mounted, enclosed circuit breakers:

1.1.1 Enclosed molded-case circuit breakers.

1.1.2 Enclosures.

1.2 *Definitions* –

1.2.1 *HD* - Heavy duty.

1.2.2 *RMS* - Root mean square.

1.3 *Submittals* -

1.3.1 *Product Data* - For each type of enclosed circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

1.3.1.1 Enclosure types and details.

1.3.1.2 Current and voltage ratings.

1.3.1.3 Short-circuit current rating.

1.3.1.4 UL listing for series rating of installed devices.

1.3.2 *Shop Drawings* – Diagram power wiring

1.3.3 *Operation and Maintenance Data* - For enclosed circuit breakers to include in operation and maintenance manuals. Include the Manufacturer's written instructions for testing and adjusting enclosed circuit breakers.

1.4 *Quality Assurance* -

1.4.1 *Electrical Components, Devices, and Accessories* - Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4.2 Comply with NFPA 70.

1.4.3 *Product Selection for Restricted Space* - Drawings indicate maximum dimensions for enclosed circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

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1.5 *Project Conditions –*

1.5.1 *Environmental Limitations:* Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1.5.2 *Ambient Temperature:* Not less than minus 22 deg F and not exceeding 104 deg F.

1.5.3 *Altitude:* Not exceeding 6600 feet.

1.6 *Coordination* - Coordinate layout and installation of enclosed circuit breakers and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2: <u>Products</u>

2.1 *Manufacturers* - In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

2.1.1 *Manufacturers* - Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 *Molded-Case Circuit Breakers*

2.2.1 *Available Manufacturers*:

2.2.1.1 Allen-Bradley; Industrial Products.

2.2.1.2 Eaton Corporation; Cutler-Hammer Products:

2.2.1.3 Square D/Group Schneider Electric:

2.2.1.4 General Electric Co.; Electrical Distribution & Control Division:

2.2.2 *Molded-Case Circuit Breaker* - NEMA AB 1, with interrupting capacity to meet available fault currents.

2.2.2.1 *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.

2.2.3 *Molded-Case Circuit-Breaker Features and Accessories* -

2.2.3.1 Standard frame sizes, trip ratings, and number of poles.

2.2.3.2 *Lugs*: Mechanical style with compression lug kits suitable for number, size, trip ratings, and conductor material.

2.2.3.3 *Under voltage Trip*: Set to operate at 35 to 75 percent of rated voltage with field-adjustable 0.1- to 0.6-second time delay.

2.3 *Ratings* - UL listed as suitable for service entrance application.

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2.4 *Enclosures -*

2.4.1 NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

2.4.1.1 NEMA 250, Type 4X, stainless steel (316L).

2.4.2 Operating handle shall be capable of being pad-locked in the Off/Open position, and interlocked to prevent the door from opening when the breaker is in the On/Closed position.

2.4.3 Complies with NEC gutter space requirements.

2.4.4 Provide the following factory installed items:

2.4.4.1 Engraved nameplate with white letters on black background.

2.4.4.2 Ground lugs.

2.4.4.3 Rain-tight hubs.

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PART 3: <u>Execution</u>

3.1 *Examination -*

3.1.1 Examine elements and surfaces to receive enclosed circuit breakers for compliance with installation tolerances and other conditions affecting performance.

3.1.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 *Installation -*

3.2.1 Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed circuit breakers.

3.2.2 Mount enclosed circuit breaker with top at no more than 6’-6”, unless otherwise indicated.

3.3 *Identification -*

3.3.1 Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Electrical Identification."

3.3.2 Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate as specified in Division 16 Section "Electrical Identification."

3.4 *Field Quality Control -*

3.4.1 Prepare for acceptance testing as follows:

3.4.1.1 Inspect mechanical and electrical connections.

3.4.1.2 Verify circuit breaker type and labeling.

3.4.1.3 Verify rating of installed overcurrent protection.

3.4.1.4 Inspect proper installation of type, size, and arrangement of mounting or anchorage devices complying with manufacturer's certification.

3.4.2 Perform the following field tests and inspections and prepare test reports:

3.4.2.1 *Infrared Scanning* -

3.4.2.1.1 *Initial Infrared Scanning* - After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed circuit breaker. Open or remove doors or panels so connections are accessible to portable scanner.

3.4.2.1.2 *Instruments, Equipment and Reports* -

3.4.2.1.2.1 Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

3.4.2.1.2.2 Prepare a certified report that identifies enclosed circuit breaker and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 *Adjusting* - Set field-adjustable enclosed circuit-breaker trip ranges.

3.6 *Cleaning* -

3.6.1 On completion of installation, vacuum dirt and debris from interiors; do not use compressed air to assist in cleaning.

3.6.2 Inspect exposed surfaces and repair damaged finishes.

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