

SECTION 26 28 16 ENCLOSED CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SCOPE

- A. Furnish and install circuit breakers of the types, sizes and quantities indicated on the contract drawings. Provide all lugs, enclosures accessories and mounting hardware necessary for proper installation and operation.

1.2 RELATED DOCUMENTS

- A. All drawings and general provisions of the Contract including Division 1 requirements apply to this section.
 - 1. ***The following sections shall be adhered to in the performance of work specified by this section:***
 - a. ***[Section [26 xx xx] - [Lugs]***
 - b. ***Section [26 xx xx] - [Wiring Methods]***
 - c. ***Section [26 xx xx] - [Grounding]***
 - d. ***Section [26 xx xx] - [Hardware and Supports]***
 - e. ***Section [26 xx xx] - [Seismic Supports]***

1.3 SUBMITTALS

- A. Provide product information prior to fabrication and installation. Product data shall include all dimensions, weights, electrical ratings, wiring diagrams, required clearances and maintenance data.

1.4 RELATED STANDARDS

- A. The molded case circuit breakers and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of the following:
 - 1. UL 489, Molded Case Circuit Breakers and Circuit Breaker Enclosures
 - 2. NEMA AB-1, Molded Case Circuit Breakers and Molded Case Switches
 - 3. CSA C22.2 No 5
 - 4. Federal Specification W-C-375B/GEN
 - 5. NEMA 250, Enclosures for Electrical Equipment (1000V Max)

1.5 QUALITY ASSURANCE

- A. Manufacturer: For equipment required for the work of this section, provide product which is the responsibility of one manufacturer.
- B. Breakers and enclosures must be purchased from a manufacturer's authorized distributor.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage from weather, excessive temperatures and construction operations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. ***[The low voltage molded case circuit breakers shall be Sentron or 3VA as manufactured by Siemens or pre-approved equal. Approved manufacturers are as follows:***
 - 1. ***Siemens***
 - 2. ***.]***

2.2 MOLDED CASE CIRCUIT BREAKERS

- A. Molded case circuit breakers shall provide circuit overcurrent protection with inverse time and instantaneous tripping characteristics and shall be Siemens Sentron, 3VA or approved equal.
- B. All circuit breakers shall have a quick-make, quick break over center toggle type mechanism and the handle mechanism shall be trip free to prevent holding contacts closed against a short circuit or sustained overload. All circuit breaker handles shall assume a position between "ON" and "OFF" when tripped automatically. Multiple pole circuit breakers shall be common trip such that an overload or short circuit on any one pole will result in all poles opening simultaneously. Arc extinction is to be accomplished by magnetic arc chutes. All ratings are to be clearly visible.
- C. Circuit breakers shall have a minimum symmetrical interrupting capacity as indicated on the drawings. The interrupting rating of the circuit breakers shall be at least equal to the available short circuit current at the line terminals of the circuit breaker. ***[Where indicated, circuit breakers shall be UL listed for series application.]***
- D. Where indicated, circuit breakers shall be current limiting. Current limiting circuit breakers shall limit the let-through I^2t to a value less than the I^2t of one-half cycle wave of the symmetrical prospective current without any fusible elements when operating within its current range.
- E. Where combination motor control is indicated on the drawings, instantaneous only circuit breakers shall be furnished as the means to provide short circuit protection. The magnetic trip settings for each phase shall be individually adjustable from the front of each circuit breaker.
- F. Where indicated, 400A and above breakers shall be UL listed for application at 100% of their continuous ampere rating in an applicable enclosure.
- G. ***[PICK ONE OR BOTH OF THE NEXT TWO SECTION THAT APPLY] [Thermal Magnetic***
 - 1. ***All circuit breakers shall be [125A] [250A] [400A] [600A] [800A] [1200A] [1600A] [2000A] [as shown on the drawings] and shall have thermal-magnetic trip units, with inverse time-current characteristics.***
 - a. ***Automatic operation of all circuit breakers shall be obtained by means of thermal-magnetic tripping devices located in each pole providing inverse time delay and instantaneous circuit protection. Instantaneous pick-up settings for each phase shall be individually adjustable on all frames 250A and above.***
 - b. ***For unusual operating conditions where the breaker is applied at an ambient temperature over 40 degrees C, the engineer shall evaluate and de-rate accordingly.***
 - c. ***Circuit breakers from 250 to 2000A frames shall have thermal magnetic trip units. The contractor shall provide circuit breakers suitable for reverse fed applications when called for on the drawings.]***
- H. ***[Solid State***
 - 1. ***As indicated on the drawings, all circuit breakers [400A] [600A] [800A] [1200A] [1600A] [as indicated on the drawings] ampere frame and above shall have microprocessor-based RMS sensing trip units.***
 - a. ***Solid State sensing shall measure true RMS current with capability to measure through to the 13th harmonic. Automatic operation of all circuit breaker frames 400A and larger shall be obtained by means of solid state tripping elements providing inverse time delay and [instantaneous] [instantaneous and short-time] circuit protection. Continuous current rating shall be adjustable from 40% to 100% of trip unit rating. Instantaneous trip settings shall also be adjustable. The optional short time pick-up trip shall have adjustable pick-up settings at definite times and with i^2t delay.***
 - b. ***Long time current adjustment shall be possible without the need for a rating plug.***
 - c. ***Where indicated, main and feeder circuit breakers shall be provided with integral ground fault protection.***

- I. *As indicated on the drawings, circuit breakers rated 1200 amps or larger shall comply with NEC 240.87's requirement for a method to reduce clearing time. These breakers shall have [zone selective interlocking] [differential relaying] [SIEMENS Dynamic Arc Flash Sentry (DAS) - Energy reducing maintenance switch with local status indicator] [energy-reducing active arc flash mitigation system] [an instantaneous trip setting that is less than the available arcing current] [an instantaneous override that is less than the available arcing current] [an approved equivalent means].*

2.3 ACCESSORIES

- A. Provide the following accessories:
 1. *[Provide shunt trips, bell alarms and auxiliary switches as shown on the contract drawings. Auxiliary switches used for PLC communication shall have gold plated contacts.]*
 2. *All accessories shall be UL Listed for field installation.*
 3. *[Unless otherwise noted, mechanical lugs shall be provided with all Molded Case Breakers.]*
 4. *[Where indicated on the drawings, compression lugs shall be provided on 1200A frame and below circuit breakers. All compression lugs shall be supplied by the circuit breaker manufacturer.]*
 5. *[Where indicated on the drawings, UL listed plug-in or rear connectors shall be provided.]*
 6. *[Where indicated on the drawings, a motor driven remote operator shall be supplied with the circuit breaker.]*

2.4 ENCLOSURES

- A. Enclosed circuit breakers shall have NEMA 1 general purpose ratings unless otherwise noted. Provide enclosures suitable for locations as indicated on the drawings and as described below.
 1. *[NEMA 1 surface or flush-mounted general purpose enclosures primarily intended for indoor use.]*
 2. *[NEMA 12 dust-tight enclosures intended for indoor use primarily to provide protection against circulating dust, falling dirt and dripping non-corrosive liquids.]*
 3. *[NEMA 3R rain tight enclosures intended for outdoor use primarily to provide protection against rain, sleet and damage from external ice formation.]*
 4. *[NEMA 4 watertight stainless steel intended for indoor or outdoor use primarily to provide protection against windblown dust and rain, splashing rain, hose-directed water and damage from external ice formation.]*
 5. *[NEMA 7, Class I, Group D hazardous location cast aluminum intended for indoor use in locations classified as Class I, Group D as defined in the National Electrical Code].*
 6. *[NEMA 9, Class II, Groups E, F, G hazardous location cast aluminum intended for indoor use in locations classified as Class II, Groups E, F and G as defined in the National Electrical Code.]*

2.5 FACTORY TESTING

- A. Standard factory tests shall be performed on the equipment in accordance with the latest version of applicable NEMA and UL standards.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The Contractor shall install all equipment in accordance with the contract drawings and manufacturers recommendations.

3.2 ADJUSTMENTS AND CLEANING

- A. The Contractor shall perform necessary field adjustments of the circuit breakers to place the equipment in final operating condition. The settings shall be in accordance with the approved protective device coordination study or as directed by the Engineer.

3.3 TESTING

- A. Perform factory and installation tests in accordance with applicable NEC, NEMA and UL requirements.

3.4 WARRANTY

- A. Equipment manufacturer warrants that all goods supplied are free of non-conformities in workmanship and materials for one year from date of initial operation, but not more than eighteen months from date of shipment.

END OF SECTION