SECTION 26 28 16.13 - OVERCURRENT PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Circuit breakers below 600 volts.

B. Fuses below 600 volts.

1.2 RELATED SECTIONS

A. Division 26.

B. Division 40.

1.3 REFERENCES

A. NECA (National Electrical Contractors Association) “Standard of Installation.”

B. NEMA AB 1 - Molded Case Circuit Breakers.

C. NFPA 70 - National Electrical Code.

D. NEMA FU 1 - Low Voltage Cartridge Fuses.

1.4 SUBMITTALS

A. Submit under provisions of Sections 01 33 00 – Submittal Procedures and 26 05 00 – Electrical General.

B. Product Data - Provide catalog sheets showing ratings, trip units, time current curves, dimensions, and enclosure details.

C. Manufacturer’s Installation Instructions - Indicate application conditions and limitations of use stipulated by product testing agency specified under Article 1.05. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Circuit Breakers - Conform to requirements of NEMA AB-1 and UL 489.

C. Furnish products listed and classified by UL or other testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

1.6 EXTRA MATERIALS

A. Furnish under provisions of Sections 01 78 39 Project Record Documents and 26 05 00 – Electrical General.

B. Furnish the following:
   1. All Fuses – Six of each.
   2. Fuses from other sections.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Circuit Breakers
   1. Schneider Electric (Square D).
   2. Eaton (Cutler-Hammer).
   3. General Electric.
   4. Or equal.

B. Distribution Fuses, Unless Otherwise Noted
   1. Bussman.
   2. Ferray-Shawmut.
   3. ABB.
   4. Or equal.

C. Motor and Device Fuses, Unless Otherwise Noted
   1. Bussman.
   2. Ferray-Shawmut
   3. Littlefuse.
   4. Or equal.

2.2 GENERAL REQUIREMENTS

A. Circuit breakers shall be of the molded case type.

B. Shall consist of the number of poles, ampere rating and interrupting rating as shown or specified.

C. Molded case circuit breakers shall have overcenter toggle-type mechanism, providing quick-make, quick-break action. Mechanism shall be mechanically trip-free from the handle so the contacts cannot be held closed against short circuit currents.

D. Multiple pole breakers shall be common trip type.

E. ON and OFF positions shall be clearly marked and color coded.

F. All breakers in panels for switching duty shall be “SWD” or “T” rated, for switching duty.

G. Breakers 250-ampere frame and larger shall have interchangeable trip.

H. All main service entrance breakers with frame sizes rated at 800 amperes or more shall have integral ground fault protection.

I. All main service breakers shall have 100 percent ampere rating and shall be service entrance rated.

J. Breakers over 100 ampere frame size shall have front adjustable magnetic trip elements to provide instantaneous tripping over a range of 400 to 1,000 percent of the continuous ampere trip rating.

K. All breakers shall be of the bolt-on type.

L. Dimensions and Performance - NEMA FU 1, Class as specified or indicated.

M. Voltage - Provide fuses with voltage rating suitable for circuit phase-to-phase voltage.

2.3 CONTACTS

A. Contacts shall be non-welding under rated operating conditions.

B. Silver-to-silver type.

C. Provide with suitable arc interrupting devices.

2.4 TERMINATIONS

A. Circuit breakers shall have lugs that accommodate wire sizes shown on the Contract Drawings, including additional lugs where shown or required.

B. Lugs shall be UL listed for copper conductors only.

C. Breakers shall be UL listed for mechanical-type lugs.

2.5 GROUND FAULT PROTECTION

A. 800-Ampere Frame Circuit Breakers or Larger
   1. Integral with circuit breaker.
   2. Adjustable Ground Fault Pickup - .2, .3, .4, .5, .75 times sensor rating 800-ampere frame sizes and larger.
   3. Ground Fault Delay - 5 bands.
   4. Source ground type ground fault sensing unless otherwise noted. Sensing methods may be changed in the field.
   5. Ground fault test button and indicator shall be provided on breaker. Provides UL listed method for field testing ground fault protection system.
   6. Neutral current transformer shall be available for four wire circuits.

B. 250-Ampere Frame Circuit Breakers or Less
   1. Integral with circuit breaker.
   2. Push to test.
   3. Reset feature.
   4. Trip indication.
   5. 0.8-second maximum pickup time.

2.6 RATINGS

A. All circuit breakers shall meet or exceed the following unless otherwise noted on the Contract Drawings or Specifications.

FRAME SIZE MAXIMUM CONSTANT CURRENT-AMPS	NEMA* INTERRUPTING CAP. SYMMETRICAL-AMPS	POLES	MAXIMUM VOLTAGE RATING
100	10,000 @ 120 volts	1	120
100	10,000 @ 240 volts	2,3	240
100	18,000 @ 480/277 volts	1	480
100	18,000	2,3	600
250 Branch	5,000	2,3	600
250 Main	35,000	2,3	600
400 Branch	65,000	2,3	600
400 Main	65,000	2,3	600
1000 Branch	65,000	2,3	600
1000 Main	65,000	2,3	600
1200 Main	65,000	2,3	600
2000 Main	100,000	2,3	600

*Interrupt ratings are at 480 volts unless noted otherwise.

2.7 BREAKER TRIP CHARACTERISTICS

All breakers shall be Type A thermal magnetic type unless noted otherwise on the Contract Drawings or specified.

A. Thermal Magnetic Type (Type A)
   1. Long time, nonadjustable, thermal overload, trip.
   2. Instantaneous, electromagnetic trip.
   3. Ambient compensating.
   4. “Push-to-trip” test button.
   5. Add shunt trip feature on all breakers 100 ampere trip and larger.

B. Integral Magnetic and Solid State Trip Type (Type B)
   1. Provide solid-state logic programmer.
   2. Long delay, range adjustable trip.

3. Magnetic pick up, range and time adjustable, trip.
4. Integral power supply.
5. 100 percent equipment rated (except 80 percent will be acceptable at the generator).
6. Integral ground fault protection where noted on the Contract Drawings or specified.
7. Ground fault system neutral current transformer for each breaker equipped for ground fault.
8. "Push-to-trip" pushbutton.
9. Adjustable rating plug type.
10. Add shunt trip feature on main and tie breakers.

C. Motor Circuit Protectors (Type MCP)
1. Each pole shall provide instantaneous short circuit protection.
2. MCP shall have provisions for adjusting the instantaneous magnetic trip element.
3. All poles shall be constructed to open, close, and trip simultaneously.
4. The MCP mechanism shall be the transient inrush suppressor type appropriate for the protection of energy efficient motors.

2.8 FUSES

A. Motor Load Feeder Switches - Class RK (time delay).

B. Other Feeder Switches - Class RK (time delay).

PART 3 - EXECUTION

3.1 GENERAL

A. Circuit breaker trip ratings and fuse sizings shown on the Contract Drawings are maximum for the specific application.

B. Breakers shall be removable from the front of the panel or board without disturbing adjacent units.

C. All individual breakers and fuses shall be suitably mounted in an enclosure in accordance with Section 26 27 16 - Control Panels and Enclosures and supported in accordance with Section 26 05 29 - Electrical Supports, Anchors and Fasteners.

D. Individual-mounted circuit breakers and fused switches shall be provided with NEMA enclosures and installed at locations shown on Drawings and in accordance with Section 26 05 00 and as required by National Electric Code at approximately 60 inches from floor to top of enclosure.

E. Fuses shall be of the rejection type unless otherwise shown or specified.

F. Install spare fuse enclosure where indicated by Owner.

G. All other breakers shall be mounted in motor control centers, panelboards, or other enclosures as shown on the Contract Drawings.

3.2 HANDLE OPERATORS

A. All enclosures for individually-mounted circuit breakers or fuses shall have enclosure-mounted handle operators, operating through approximately 180-degree arc. Flush mounted circular rotating handle operators are unacceptable.

3.3 DISCONNECTING MEANS - LOCKING

A. For separately-mounted exterior circuit breakers, safety and disconnect switches, provide locking-type handles to be locked in both the ON (closed) or OFF (open) positions.

3.4 IDENTIFICATION

A. Circuit breakers shall be provided with uniformly designed nameplates to clearly indicate the type, rating, listing/recognition/certification marks, and other information as defined in UL 489 in accordance with Section 26 05 53 - Electrical System Identification.

3.5 TERMINALS

A. All terminals shall comply with UL 486A and B and CSA 1165 Standards. Torque markings shall be provided and followed per UL 489.

B. Terminals shall be amply sized, including adapters or special lugs to connect the conductor(s) as shown, specified or required.

3.6 RATINGS - FUSES

A. Main distribution fuses, where used, shall be sized as shown on the Contract Drawings.

B. Motor and device fuses shall be sized as per the manufacturer’s requirements in accordance with the NEC.

3.7 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of 01 40 00 - Quality Requirements, and 26 08 00 - Electrical Field Acceptance Tests.

B. Inspect and test each circuit breaker 800 amperes and larger to NETA ATS, latest edition.

C. Inspect each circuit breaker visually, per NETA ATS, latest edition.

D. Perform several mechanical On-Off operations on each circuit breaker.

E. Verify circuit continuity on each pole in closed position.

F. Determine that circuit breaker will trip on overcurrent condition, with tripping time to NEMA AB 1 requirements.

G. Include description of testing and results in test report.

3.8 ADJUSTING

A. Adjust work under provisions of Sections 01 78 39 Project Record Documents and 26 08 00 Electrical Field Acceptance Tests.

B. Adjust trip settings so that circuit breakers coordinate with other overcurrent protective devices in circuit.

C. Adjust trip and time delay settings to provide adequate protection from overcurrent and fault currents.

END OF SECTION