**SECTION 16412**

**ENCLOSED CIRCUIT BREAKERS**

**PART 1 - GENERAL**

1.1 SUMMARY

A. Section includes molded-case and insulated-case circuit breakers.

1.2 REFERENCES

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


1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures.

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

1.4 CLOSEOUT SUBMITTALS

A. Section 01770 - Closeout and turnover procedures.

B. Project Record Documents: Record actual locations and continuous current ratings of circuit breakers.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

**PART 2 - PRODUCTS**

2.1 MOLDED CASE CIRCUIT BREAKER

A. Product Description: Molded-case circuit breaker conforming to UL 489, suitable for use as service entrance equipment where so applied.

B. Non Field-Adjustable Trip Circuit Breaker: Circuit breakers with frame size below 200 amperes U.O.N. Cutler-Hammer type FD or equal.

D. Current Limiting Circuit Breaker: Circuit breaker indicated as current-limiting has automatically-resetting current limiting elements in each pole. Let-through Current and Energy: Less than permitted for same size Class RK-5 fuse.

E. Solid-State Circuit Breaker: Electronic sensing, timing, and tripping circuits for adjustable current settings; ground fault trip with integral ground fault sensing (if required); instantaneous trip; and adjustable short time trip. Circuit breakers with frames size 400 amperes and above: Cutler-Hammer type LD-310**NOTE TO STANFORD: CHECK THIS PART NUMBER – MAY LIMIT MAX. SIZE TO ONLY 600A** or equal.

F. Current Limiter: Designed for application with molded case circuit breaker.
   1. Coordinate limiter size with trip rating of circuit breaker to prevent nuisance tripping and to achieve interrupting current rating specified for circuit breaker.
   2. Interlock trip circuit breaker and prevent closing circuit breaker when limiter compartment cover is removed or when one or more limiter is not in place or has operated.

G. Accessories: As scheduled to meet project requirements. Conform to UL 489.
   2. Grounding Lug: In each enclosure.
   3. Shunt Trip Device: 120 VAC U.O.N.
   4. Undervoltage Trip Device: 120 VAC U.O.N.
   5. Auxiliary Switch: 2A/2B U.O.N.
   6. Alarm Switch: 1A/1B U.O.N.
   7. Electrical Operator: 120 VAC U.O.N.

H. Applications
   1. Molded case circuit breakers may be installed as individually mounted enclosed breakers or in switchboards, distribution panelboards or on busway systems as main or distribution devices.

I. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Provide solid neutral assembly and ground bar.

2.2 INSULATED CASE CIRCUIT BREAKER

A. Product Description: Enclosed, insulated-case circuit breaker conforming to NEMA AB 1, suitable for use as service entrance equipment where so applied.

B. Trip Unit: Electronic sensing, timing, and tripping circuits for adjustable current settings; ground fault trip with integral ground fault sensing, if required; instantaneous trip; and adjustable short time trip.
C. Accessories: As scheduled to meet project requirements. Conform to UL 489.
   2. Grounding Lug: In each enclosure.
   3. Shunt Trip Device: 120 VAC U.O.N.
   4. Undervoltage Trip Device: 120 VAC U.O.N.
   5. Auxiliary Switch: 2A/2B U.O.N.
   6. Alarm Switch: 1A/1B U.O.N.
   7. Electrical Operator: 120 VAC U.O.N.

D. Applications:
   1. Insulated case circuit breakers may be installed as individually mounted enclosed breakers or, in switchboards, distribution panelboards or on busway systems as main or distribution devices.

E. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Provide solid neutral assembly and equipment ground bar.

2.3 ENCLOSURE
   A. UL 489 as required to meet conditions for molded case or insulated case breakers. Provide listed enclosure from steel finished with manufacturer’s standard gray finish.
      1. Interior Dry Locations: Type 1
      2. Exterior Locations: Type 3R
      3. Industrial Locations: Type as specified.

PART 3 -EXECUTION

3.1 INSTALLATION
   A. Install in accordance with NECA "Standard of Installation."
   B. Install enclosed circuit breakers plumb. Provide supports as specified elsewhere in Electrical specifications.
   C. Height: 5 ft to operating handle.
   D. Locate and install engraved plastic nameplates as specified elsewhere in Electrical specifications.

3.2 FIELD QUALITY CONTROL
   A. Inspect and test in accordance with NETA ATS, except Section 4.
   B. Perform inspections and tests listed in NETA ATS, Section 7.6.1.1.
3.3 ADJUSTING

A. Adjust trip settings so that circuit breakers coordinate with other overcurrent protective devices in circuit as indicated in the project coordination study.

B. Adjust trip settings to provide adequate protection from overcurrent and fault currents.

3.4 EXISTING WORK

A. Disconnect and remove circuit breakers. All existing enclosed circuit breakers which are to be reused or reinstalled shall be cleaned and repaired.

B. Ensure access to existing enclosed circuit breakers and other installations which remain active and which require access. Modify installation or provide access panel as appropriate.

END OF SECTION