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**Part 1            General**

**1.1               RELATED SECTIONS**

- .1       Section 26 05 00 - Common Work Results for Electrical.

**1.2               REFERENCES**

- .1       CSA International.
  - .1       CSA C22.2 No. 5-09, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

**1.3               ACTION AND INFORMATIONAL SUBMITTALS**

- .1       Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2       Product Data:
  - .1       Submit manufacturer's instructions, printed product literature and data sheets for circuit breakers and include product characteristics, performance criteria, physical size, finish and limitations.
- .3       Include time-current characteristic curves for breakers with interrupting capacity of 22,000 A symmetrical (rms) and over at system voltage or with ampacity of 200 A and over.
- .4       Certificates:
  - .1       Prior to installation of circuit breakers in either new or existing installation, Contractor must submit 3 copies of a production certificate of origin from the manufacturer. Production certificate of origin must be duly signed by factory and local manufacturer's representative certifying that circuit breakers come from this manufacturer and are new and meet standards and regulations.
    - .1       Production certificate of origin must be submitted to Departmental Representative for approval.
  - .2       Delay in submitting production of certificate of origin will not justify any extension of contract and additional compensation.
  - .3       Any work of manufacturing, assembly or installation to begin only after acceptance of production certificate of origin by Departmental Representative. Unless complying with this requirement, Departmental Representative reserves the right to mandate manufacturer listed on circuit breakers to authenticate new circuit breakers under the contract, and to Contractor's expense.
  - .4       Production certificate of origin must contain:
    - .1       Manufacturer's name and address and person responsible for authentication. Person responsible must sign and date certificate.
    - .2       Licensed dealer's name and address and person of distributor responsible for Contractor's account.

- .3 Contractor's name and address and person responsible for project.
- .4 Local manufacturer's representative name and address. Local manufacturer's representative must sign and date certificate.
- .5 Name and address of building where circuit breakers will be installed:
  - .1 Project title.
  - .2 End user's reference number.
  - .3 List of circuit breakers.

#### **1.4 DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver, store, and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store circuit breakers off ground, indoors, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect circuit breakers from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse of packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

#### **1.5 ACCEPTABLE PRODUCTS AND MATERIALS**

- .1 Where a particular brand name is stipulated, see Instructions to Bidders for procedure for requesting approval of substitute materials and products.

### **Part 2 Products**

#### **2.1 BREAKERS GENERAL**

- .1 Moulded-case circuit breakers, ground-fault circuit-interrupters, fused circuit breakers, and accessory high-fault protectors: to CSA C22.2 No. 5.
- .2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.
- .3 Common-trip breakers: with single handle for multi-pole applications.
- .4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
  - .1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.
- .5 Circuit breakers with interchangeable trips as indicated.

- .6 Circuit breakers to have minimum symmetrical Rms interrupting capacity rating equal to the interrupting capacity of the panelboard in which they are installed.

## **2.2 THERMAL MAGNETIC BREAKERS DESIGN A**

- .1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.
- .2 Acceptable Products:
  - .1 240 V circuit breakers:
    - .1 BAB Series of Eaton (Cutler-Hammer).
    - .2 QOB Series of Schneider Electric (Square D).
    - .3 BL Series of Siemens.
    - .4 Replacement materials or products: approved by addendum according to Instructions to bidders.
  - .2 347 V/600 V circuit breakers:
    - .1 FDB Series of Eaton (Cutler-Hammer).
    - .2 EDB Series of Schneider Electric (Square D).
    - .3 NGB Series of Siemens.
    - .4 Replacement materials or products: approved by addendum according to Instructions to bidders.

## **2.3 SOLID STATE TRIP BREAKERS DESIGN D**

- .1 Moulded case circuit breaker to operate by means of solid-state trip unit for circuit breakers in panelboard W-S-P3N1 and for circuit breakers of 400 A and above, with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, and long time, short time, and instantaneous tripping, as indicated.
- .2 Acceptable Products:
  - .1 FDB Series of Eaton (Cutler-Hammer).
  - .2 Powerpact Series of Schneider Electric (Square D).
  - .3 Sentron Series of Siemens.
  - .4 Replacement materials or products: approved by addendum according to Instructions to bidders.

## **2.4 SEMICONDUCTOR TRIP UNITS**

- .1 Solid-state tripping system consisting of three (3) current sensors, microprocessor-based trip device and flux-transfer shunt trip. Current sensors shall provide operation and signal function. The trip unit shall use microprocessor-based technology to provide the basic adjustable time/current protection functions. True rms sensing circuit protection shall be achieved by analyzing the secondary current signals received from the circuit breaker current sensors, and initiating trip signals to the circuit breaker trip actuators when

predetermined trip levels and time-delay settings are reached. Interchangeable current sensors with their associated rating plug shall establish the continuous trip rating of each circuit breaker

- .2 The trip unit shall have an information system that provides LEDs to indicate mode of trip following an automatic trip operation. The indication of the mode of trip shall be retained after an automatic trip. A reset button shall be provided to turn off the LED indication after an automatic trip.
- .3 The trip unit shall be provided with a display panel, including a representation of the time/current curve that will indicate the protection functions. The unit shall be continuously self-checking and provide a visual indication that the internal circuitry is being monitored and is fully operational.
- .4 Complete system selective coordination shall be provided by the addition of the following individually adjustable time/current curve shaping solid-state elements:
  - .1 All circuit breakers shall have adjustments for long delay pickup and time.
  - .2 Main circuit breakers shall have individual adjustments for short delay pickup and time, and include  $I^2t$  settings.
  - .3 Main circuit breakers shall have an adjustable instantaneous pickup.
  - .4 Main circuit breakers shall have individually adjustable ground fault current pickup and time, and include  $I^2t$  settings or ground alarm only.
- .5 The trip unit shall be provided with a making-current release circuit. The circuit shall be armed for approximately two cycles after breaker closing and shall operate for all peak fault levels above 11 times the ampere value of the rating plug.
- .6 The microprocessor-based trip unit shall have both powered and unpowered thermal memory to provide optimum circuit protection.
- .7 The trip unit shall have a LCD display showing phase, neutral, ground current, and overload.
- .8 The trip unit shall be equipped to permit communication via a network twisted pair to the LAN system provided in the equipment for remote monitoring and control.
- .9 Acceptable products:
  - .1 Digitrip unit of Eaton (Cutler-Hammer).
  - .2 Micrologic unit of Schneider Electric (Square D).
  - .3 Sensitrip unit of Siemens.
  - .4 Replacement materials or products: approved by addendum according to Instructions to bidders.

## **2.5 OPTIONAL FEATURES**

- .1 Include as needed:
  - .1 Shunt trip.
  - .2 Auxiliary switch.
  - .3 Under-voltage release.

- .4 On-off locking device.
- .5 Handle mechanism.

### **Part 3 Execution**

#### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied.

#### **3.2 INSTALLATION**

- .1 Install circuit breakers as indicated.

#### **3.3 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**END OF SECTION**