
PART 1 GENERAL**1.1 RELATED DOCUMENTS**

- A. The requirements of the General Conditions, Supplementary Conditions and the following specification sections apply to all Work herein:
1. Section 26 00 10 - General Requirements
 2. Section 26 00 20 - Scope of Work
 3. Section 26 05 19 - Electrical Conductors - 600 Volts
 4. Section 26 05 26 - Grounding and Bonding
 5. Section 26 05 23 - Control - Voltage Electrical Power Systems
 6. Section 26 08 13 - Testing

1.2 SUMMARY

- A. Furnish and install all fused and nonfused enclosed switches as specified herein, as required by the National Electrical Code, and as indicated on the Drawings. Nonfused switches shall not be provided with fuse clips.

1.3 REFERENCE STANDARDS

- A. Each enclosed switch, enclosed circuit breaker and all components shall be designed, manufactured and tested in accordance with the latest applicable industry standards including the following:
1. UL Standard 98 - Enclosed Switches
 2. Federal Specification WS-865-C - Switch, Box (Enclosed) and Surface Mounted
 3. NEMA KS 1 - Enclosed Switches
 4. NFPA 70 - National Electrical Code (NEC)
 5. UL 489 - Molded Case Circuit Breakers and Circuit Breaker Enclosures
 6. NEMA AB-1 - Molded Case Circuit Breakers and Molded Case Switches
 7. NEMA 250 - Enclosures for Electrical Equipment (1000V Max)
- B. All equipment and material to be furnished and installed on this Project shall be UL or ETL listed, in accordance with the requirements of the authorities having jurisdiction, and suitable for its intended use on this Project.

1.4 SUBMITTALS

- A. The following submittal data shall be furnished according to the General Conditions and Section 26 00 10 and shall include, but not be limited to:
1. Enclosed Switches including dimensions, knockout sizes and locations, NEMA construction, capacity, voltage, Short Circuit Current Rating, Fuse Class, etc.
 2. Enclosed Circuit Breakers including dimensions, knockout sizes and locations, NEMA construction, capacity, voltage, short circuit current ratings, breaker catalog number and ratings, etc.
 3. Field Test Reports.
- B. All items or equipment listed above with asterisks (*) shall be certified by the manufacturer using Manufacturer Certification "MCA" as set forth in Section 26 00 10. See Section 26 00 10 for certification requirements.

1.5 WARRANTY

- A. Comply with the requirements of the General Conditions and Section 26 00 10.

PART 2 PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. If it complies with these Specifications, enclosed switches manufactured by one of the following manufacturers will be acceptable:
1. Cutler Hammer
 2. General Electric
 3. Siemens
 4. Square D

2.2 RATINGS

- A. Enclosed Switches: All enclosed switches shall be Type HD (heavy duty) and shall be suitable for use at 480 Volts and 208 Volts or at other voltages as indicated on the Drawings. Switches protecting motor feeders shall be "horsepower" rated.
- B. Enclosed Circuit Breakers: All enclosed circuit breakers shall be suitable for use at 480 Volts, 208 Volts or at other voltages as indicated on the Drawings. Enclosed circuit breakers shall be listed by UL and have a minimum short circuit current rating of 14,000 amps at 480 Volts or 10,000 amps at 240 Volts according to the nominal utilization voltage where installed. Where the available fault current is indicated on the Drawings to be greater than that listed above, the enclosed circuit breaker shall have a short circuit current rating at the applied voltage that exceeds the available fault current indicated.
- C. Enclosed switches and enclosed circuit breakers larger than 1200 amps shall be of switchboard construction. Refer to section 26 24 13 "Switchboards – 600 Volts" for requirements.

2.3 CONSTRUCTION

- A. All enclosed switches and enclosed circuit breakers shall have permanent nameplates mounted on the cover that indicate the switch type and ratings.
- B. All enclosed switches and enclosed circuit breakers shall have defeatable door interlocks that prevent the door from opening when the operating handle is in the "ON" position.
- C. All enclosed switches and enclosed circuit breakers shall have provisions for padlocking in the "OFF" position.
- D. Busway plug type switches shall be manufactured by the busway manufacturer and shall be specially designed for busway service.
- E. All enclosed switches and enclosed circuit breakers exposed to the weather or to water damage shall be NEMA Type 3R with approved conduit hubs installed on top of these switches, unless otherwise shown on the Drawings.
- F. All enclosed switches and enclosed circuit breakers located in cooling tower areas shall be NEMA Type 4XSS with approved conduit hubs installed on top of the enclosure, unless otherwise shown on the Drawings.
- G. Fusible switches shall be provided with appropriate fuse clips.
- H. Circuit breakers 1200 amps and below shall be molded case circuit breakers. Circuit breakers shall be provided with thermal and magnetic protective elements or shall have RMS sensing solid state trip units, which emulate the thermal magnetic protection characteristics. Where indicated on the Drawings to have ground fault protection, breakers shall be provided with a solid state trip unit with adjustable long time pickup, short time pickup and delay, instantaneous pickup and ground fault pickup and delay features. Provide neutral current transformers where ground fault protection is required for 3-phase, 4-wire installations and install per manufacturer recommendations. Provide integral accessories such as shunt trips and auxiliary switches as required or indicated on the Drawings.

- I. All current carrying parts shall be 98% conductive copper with tin or silver plated surfaces.
- J. Provide phase lugs, ground lugs, and neutral lugs for the number and sizes of conductors specified on the Drawings. See Section 26 05 19 titled "Electrical Conductors - 600 Volts" for termination requirements and space requirements within the enclosure.

PART 3 EXECUTION

3.1 INSTALLATION

- A. The Electrical Subcontractor shall install all enclosed switches and enclosed circuit breakers per the manufacturer's recommendations and as indicated on the Drawings.

3.2 FACTORY TESTING

- A. All standard factory tests shall be performed in accordance with the latest version of NEMA and UL Standards.

3.3 FIELD TESTING

- A. Enclosed circuit breakers with ground fault protection: After construction Work is complete and prior to energizing of the enclosed circuit breaker, the ground fault protection system shall be field tested by one of the following companies: General Electric Engineering and Service, Cutler Hammer Engineering and Service, Siemens Westinghouse Technical Services, Square D Technical Services or a manufacturer authorized service and testing organization.
 - 1. The manufacturer's testing agency shall utilize a circuit breaker test set designed to test the specific breaker being tested for secondary current injection testing or utilize a primary current injection test set to test the circuit breaker trip unit. Follow UL 489 testing procedures when conducting primary current injection testing. The measured time current relationships required to trip the circuit breaker shall be compared to the trip characteristic curves.
 - 2. If the circuit breaker trips outside the range of values indicated on the curve the circuit breaker trip unit shall be replaced and the new trip unit shall be tested. Where the circuit breaker is not UL listed for field replacement of the trip unit, a new circuit breaker shall be installed and tested as required hereinbefore.
 - 3. This test shall include a polarity verification of the ground sensor circuits.
 - 4. Four (4) copies of all test results certified by the testing agency shall be submitted by the Subcontractor to the Engineer for review and two (2) copies to the Owner. See Section 26 00 10 for requirements.
- B. Adjustable circuit breakers shall be adjusted to the settings indicated in the coordination study. Refer to section 26 05 73 "Electrical Power System Study" for requirements.
- C. Refer to Section 26 08 13 titled "Testing" for additional testing requirements.

END OF SECTION