

SECTION 16426
LOW-VOLTAGE METAL-CLAD SWITCHGEAR - INSTALLATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following: Free-standing, floor-mounted, dead-front, metal-enclosed, low-voltage power circuit breaker switchgear.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Section 16191, Supporting Devices.
 - 2. Section 16196, Electrical Identification.
 - 3. Section 16450, Grounding.
 - 4. Section 16950, Electrical Testing.

1.2 REFERENCES

- A. National Fire Protection Association (NFPA)
 - 1. NFPA 70-1999, National Electrical Code (NEC).

1.3 SUBMITTALS

- A. Submit field test reports for approval.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect equipment and other parts and auxiliary devices or accessories against corrosion, dampness, breakage, or vibration damage that might be encountered in transportation and handling.
- B. Store in a clean, dry space.
- C. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- D. Handle in accordance with manufacturer/Vendor's written instructions.
- E. Lift only with lugs provided for the purpose.
- F. Handle carefully to avoid damage to motor control center components, enclosure, and finish.

PART 2 - PRODUCTS

- 2.1 Medium-Voltage, Metal-Clad switchgear are CMFE. See specification Section 16370 for equipment requirements and for actual equipment being provided.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install switchgear assembly in accordance with the drawings and Manufacturer instructions.
- B. Terminate overhead conduits at designated enclosure locations.

- C. Terminate feeder conductors to the load side terminals of the appropriate breakers in accordance with the design drawings.
- D. Verify that the breaker trip settings are in accordance with the design drawings and manufacturer's data.

3.2 FIELD QUALITY CONTROL

- A. After completion of installation, inspect equipment to determine the equipment has not been damaged in transit and is properly installed, conditioned, and ready to be energized, and accept design load.
- B. Before energizing switchgear, make the following tests:
 - 1. Take ohmmeter readings between the switchgear ground bus and the assembly enclosure. The maximum acceptable resistance shall be 0.01 ohm.
 - 2. Connect a "Kelvin Bridge" between the assembly ground bus (to which the equipment ground conductor is connected) and the nearest building ground bus or ground strap connected directly to the building ground grid. The readings taken will indicate the resistance between the assembly ground bus and the building ground grid. The maximum permissible resistance shall be 0.1 ohm.
- C. After completing the above tests, additional checks shall include the following:
 - 1. Check mechanical operation of all breakers before operating with power.
 - 2. Check alignment of draw-out type gear, including floor steel, main and auxiliary contacts, shutters, position indicators, cell and breaker alignment, etc.
 - 3. Check visually the development and operation of control, auxiliary, and test switches.
 - 4. Check terminal-to-terminal routing of all cubicle wiring against the contract drawings and the manufacturer's drawings.
 - 5. Check ratios and polarity of all current and potential transformers.
 - 6. Check operation of all instruments.
 - 7. Check phasing of busses. All switchgear busses shall be phased so that circuit breaker phase identification is 1-2-3, left to right, as viewed from the front of the breaker when it is racked in.
 - 8. Check that phasing of auxiliary busses and all connections are compatible with phasings of the main bus.
 - a. Switchgear phase identification 1-2-3 is equivalent to transformer phase identification XI-X2-X3 and phase identification [C-B-A at Y-I2] [A-B-C at Oak Ridge K-25 Site, PGDP, and ORNL].
 - b. Check phasing of all transformers (to which new switchgear is connected) against nameplate data. Transformer phase identification HI-H2-H3 shall be phase identification 1-2-3 and shall be equivalent to phase identification [C-B-A at Y-I2] [A-B-C at K-25, PGDP, and ORNL].
- D. Test No. 1 - Insulation Resistance
 - 1. All low-voltage switchgear shall be given an "Insulation Resistance Test" using a 1,000-V insulation tester (Simpson Model 405 or approved equal). The bus work and each circuit breaker shall be tested separately. Each phase shall be meggered to ground with the other two phases grounded.
 - 2. The voltage shall be applied for a minimum of 3 min and until reading reaches a nearly constant value. Tests shall be made before any power conductors and/or transformers are connected to the switchgear.
 - 3. Minimum acceptable resistance readings shall be 100 megohms.
- E. Test No. 2 - Operational
 - 1. An "Operational Test" shall be performed on all breakers and switches and their associated alarm and indicating devices to provide satisfactory performance. This

shall include mechanical and electrical operation from all control points and operation of relays and all other safety devices.

2. All interlock devices shall be tested operationally.

F. Test No. 3 - Trip Settings

1. Circuit breaker over current trips shall be checked against breaker family of curves at 150%, 200%, and 400% of trip setting by means of a high-current machine.
2. If trip devices do not perform correctly, make necessary adjustments; and repeat test. (Note: This test may be performed by the CM.)

END OF SECTION 16426