

SECTION 16425
SWITCHBOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES:

- A. Main and distribution switchboards.

1.2 References

- A. ANSI C12 - Code for Electricity Metering.
- B. ANSI C39.1 - Requirements for Electrical Analog Indicating Instruments.
- C. ANSI C57.13 - Requirements for Instrument Transformers.
- D. FS W-C-375 - Circuit Breakers, Molded Case, Branch Circuit and Service.
- E. FS W-F-870 - Fuse holders (For Plug and Enclosed Cartridge Fuses).
- F. FS W-S-865 - Enclosed Knife Switch.
- G. NEMA AB 1 - Molded Case Circuit Breakers.
- H. NEMA KS 1 - Enclosed Switches.
- I. NEMA PB 2 - Dead Front Distribution Switchboards.
- J. NEMA PB 2.1 - Instructions for Safe Handling, Installation, Operation and Maintenance of Dead front Switchboards Rated 600 Volts or Less.

1.3 Submittals

- A. Submit product data under provisions of Section 01300.
- B. Include front and side views of enclosures with overall dimensions shown; conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, neutral, and ground; switchboard instrument details; instructions for handling and installation of switchboard; and electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time-current curves of all equipment and components.
- C. Submit manufacturer's instructions under provisions of Section 01300.

1.4 Operation and Maintenance data

- A. Submit operation and maintenance data under provisions of Section 01700.
- B. Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 Delivery, Storage, and Handling

- A. Deliver products to the site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.
- C. Store in a clean, dry space. 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 NEMA PB2.1 and manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Square D.
- B. General Electric.
- C. Cutler Hammer.
- D. Siemens/ITE.
- E. Westinghouse

2.2 Switchboard Construction and Ratings

- A. Factory-assembled, dead front, metal-enclosed, and self-supporting switchboard assembly conforming to NEMA PB2, and complete from incoming line terminals to load-side terminations.
- B. Switchboard electrical ratings and configurations as shown on Drawings.
- C. Line and Load Terminations: Accessible from the front only of the switchboard, suitable for the conductor materials used.
- D. Main Section Devices: Panel mounted. Individually mounted. Individually or mounted and compartmented.
- E. Distribution Section Devices: Panel mounted, Individually mounted, or Individually mounted and compartmented.
- F. Auxiliary Section Devices: Individually mounted or individually mounted and compartmented.
- G. Bus Material: Copper, 1000 amp per square inch.
- H. Bus Connections: Bolted, accessible from front for maintenance.
- I. Provide copper ground bus through the length of the switchboard.
- J. Enclosure shall be NEMA PB 2 Type 1 - General Purpose or 3R - Rain tight. Sections shall align at front and rear.
- K. Finish: Manufacturer's standard color, enamel over external surfaces and minimum one coat corrosion-resisting paint or plated with cadmium or zinc on internal surfaces.
- L. Provide surge protection meeting the requirements of 16610.
- M. Pull Box: Same construction as switchboard, size as shown on Drawings. Top and sides shall be removable. Insulating, fire-resistive bottom with separate openings for each circuit to pass into switchboard.
- N. Pull Section: Same construction as switchboard, size as shown on Drawings, arrange as shown on Drawings.
- O. Future Provisions: Fully equip spaces for future devices with bussing and bus connections, suitably insulated and braced for short circuit currents. Continuous current rating as indicated on Drawings.
- P. Provide instruments and sensors as per 16425-2.6 on main switchboards of 1000 amps or greater.
- Q. Install neutral and ground bus bars in the front of the switchboard for easy access for maintenance.

2.3 Switching and Overcurrent Protective Devices

- A. Fusible Switch Assemblies: NEMA KS 1; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle. Provide interlock to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: Designed to accommodate Class R fuses, type as specified.
- B. Fusible Switch Assemblies, 800 Amperes and Larger: Bolted pressure contact switches. Fuse Clips: Designed to accommodate Class L fuses.
- C. Molded Case Circuit Breakers: NEMA AB 1 provides circuit breakers with integral thermal and instantaneous magnetic trip in each pole.
- D. Molded Case Circuit Breakers with Current Limiters: NEMA AB 1; provide molded case circuit breakers with replaceable current limiting elements, in addition to integral thermal and instantaneous magnetic trip in each pole.
- E. Current Limiting Molded Case Circuit Breakers: NEMA AB 1; provide molded case circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole. Interrupting rating 100,000 rms amperes symmetrical let-through current and energy level less than permitted for same size Class RK-5 fuse.
- F. Solid-state Molded Case Circuit Breakers: NEMA AB 1; provide with electronic sensing, timing and tripping circuits for adjustable current settings; ground fault trip; instantaneous trip; and adjustable short time trip. Provide stationary mounting. Provide zero sequence type ground fault sensor.

2.4 Instruments and Sensors

- A. Provide main switchboard of 1000 amps or greater with a stand alone, microprocessor based, three phase power metering device, with six digit LED display, Ethernet communication card, and MODBUS port. Metering device shall provide metering functions, sag/swell monitoring, trending and forecasting functions, web-enable access directly to the meter, and disturbance monitoring. Device shall be equal to Square D Power Logic Circuit Monitor Model CM 3350 with Display unit and shall be recessed in the front of the switchboard. Power Logic Circuit Monitor device shall have all required software and programming to allow monitoring of the electrical power data information via Universities Energy Management System and Data NetWork System.
- B. Ground Fault Sensor: Zero sequence type.
- C. Ground Fault Relay: Adjustable ground fault sensitivity from 200 to 1200 amperes, time delay adjustable from 0 to 15 seconds. Provide monitor panel with lamp to indicate relay operation, TEST and RESET control switches.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install switchboard in locations shown on Drawings, in accordance with manufacturer's written instructions and NEMA PB 2.1.
- B. Tighten accessible bus connections and mechanical fasteners after placing switchboard.
- C. Install fuses in each switch.
- D. Coordinate with energy management system's contractor to insure that the Power Logic Circuit Monitor Device is fully operational upon connection to the Universities energy management system. Electrical contractor must furnish and install all required conduits, junction boxes, and power requirements.
- E. Install ¾" conduit from the Power Logic Circuit Monitor Device to the Florida Tech Data Network System.

3.2 Field Quality Control

- A. Inspect completed installation for physical damage, proper alignment, anchorage, and grounding.
- B. Measure insulation resistance of each bus section phase to phase and phase to ground for one minute each. Test voltage shall be 500 volts, and minimum acceptable value for insulation resistance is 2 megohms.
- C. Check tightness of accessible bolted bus joints using a calibrated torque wrench. Tightness shall be in accordance with manufacturer's recommended values.

3.3 Adjusting and Cleaning

- A. Adjust all operating mechanisms for free mechanical movement.
- B. Touch up scratched or marred surfaces to match original finish.
- C. Adjust trip and time delay settings to values as instructed by the Architect/Engineer.

END OF SECTION