PART 1  GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Requirements for main and distribution switchboards.

B. Related Sections:
   1. Section 16420 - Service Entrance
   2. Section 16430 - Metering
   3. Division 9 - Painting

1.02 REFERENCES

A. Specify Underwriters Laboratories (UL) listed equipment, assemblies and materials.

B. Where appropriate, refer to current ANSI and NEMA Standards for material ratings.


1.03 SUBMITTALS

A. Require submittals under the provisions of Section 16010 - Basic Electrical Requirements and 01300 - Submittals.

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, including fuses and breakers provided.

PART 2  PRODUCTS

2.01 MANUFACTURERS

A. Main and Distribution Switchboards:
   1. General Electric
   2. Westinghouse/Cutler Hammer
3. ITE - Siemens
4. Square D

B. Fuses:
1. Bussmann
2. Gould Shawmut
3. Littelfuse

2.02 CONSTRUCTION AND RATING

A. Main and Distribution Switchboards:
1. System shall be factory assembled, dead front, metal enclosed, self supporting and conforming to NEMA PB2.
2. Depending on rating of switchboard, provide for front only accessibility or front and rear accessibility.
3. Bus material shall be copper. The switchboard shall be designed for future expansion, with full size horizontal bussing throughout and extension stub outs. Coordinate bus short circuit rating with available fault current. Sized in accordance with NEMA PB.2.
4. Bus connections shall be bolted with provisions for accessibility of joints after switchboard is installed.
5. Provide code sized copper ground bus throughout switchboard.
6. Provide instrument transformers as defined in section 16430 metering.
7. Enclosure rating shall be suitable for environment i.e. NEMA Type 1 - General Purpose or NEMA Type 2 - Raintight.
8. Enclosure shall be finished in manufacturer’s standard enamel on external surfaces. Internal surfaces shall have a minimum of one coat of corrosion resistant paint or shall be cadmium or zinc plated.
9. Spaces for future devices shall have full capacity bus and be equipped with bus connection. Brace and insulate spaces for available fault current.

B. Overcurrent Protective Devices:
1. Fusible Switch Assemblies Below 800 Amperes:
a. Quick make, quick break, load interrupter enclosed knife switch with externally operable handle. Provide override release screw to permit opening front cover with switch in the “on” position. Handle lockable in the “off” position. Fuse clips to accommodate fuse class required by fault current availability.

2. Fusible Switch Assemblies 800 Amperes and Larger:
   a. Bolted pressure contact switches. Fuse clips to accommodate fuse class required by fault current availability.

3. Molded Case Circuit Breakers:
   a. Provide with integral thermal and magnetic trip in each pole.

4. Solid-State Molded Case Circuit Breakers:
   a. Provide with electronic sensing, timing and tripping circuits for adjustable current settings; ground fault trip, instantaneous trip and adjustable short time and long time trip. The instantaneous shall be capable of being turned on and turned off on the main breaker only.

5. Air Circuit Breakers:
   a. Provide factory assembled, low voltage air circuit breakers. Include electronic sensing, timing and tripping circuits for adjustable current long time delay, long time pickup, ground fault operation, short trip and instantaneous trip and turned off on the main breaker only.

6. Type of overcurrent device to be used shall be coordinated with Department of Facilities Management.

7. A coordination study must be provided at the 90% review stage which verifies device and fuse selection. Includes time current curves and device settings. This is required for all 13.2 kV, 480V and 208V system additions or modifications.

8. If building function warrants, provide surge and noise protection TVSS system.

9. Ground Fault Relay and Sensor:
   a. Zero sequence sensor with adjustable ground fault relay. Adjustment from 200 to 1200 amperes, time delay adjustable from 0 to 15 seconds. Provide with monitor panel and lamp to indicate relay operation, “TEST” and “RESET” control switches.

C. Fuses:

1. Amperage as required, rejection type current limiting fuses; size as indicated on drawings.
PART 3   EXECUTION

3.01   INSTALLATION

A. Assure, through coordination with design team, that adequate working space is provided around and above switchboard.

B. Require that all mechanical piping and ductwork not related to the switchboard operation be routed outside of the electrical equipment room.

C. Coordinate with Mechanical Engineer to assure adequate air quantities for proper ambient conditions in the electrical room.

D. Mount switchboard on 4” high full sized housekeeping pad.

E. Coordinate size of switchboard with door openings and access corridors to assure that switchboard can be moved into room after structure is completed. Indicate shipping split as necessary. Make provisions for future removal of switchgear from completed structure.

F. Require tightening of shipping split bolts and terminations on busses using calibrated torque wrench to manufacturer’s requirements.

G. Specify a framed Record Drawing showing final arrangement and modifications and capacities of switchboard and system one-line for easy reference, mounted on main electric room wall.

H. Specify a spare fuse cabinet to be located in main switchboard room. Cabinet shall be equipped with a complete spare set of fuses for each fuse type and size used on building electrical system. Cabinet shall be labeled per Section 16195 - Identification.

I. Electrical rooms shall not contain other systems or equipment not related to the electrical distribution system. This shall include but not be limited to such systems as: telephone, communications, mechanical, piping, drains, etc.

J. Require filtered, thermostatically controlled ventilation for all main switchboard rooms and transformer vaults.

K. Provide battery powered or emergency lighting in main switchboard rooms.

L. Specify equipment be shipped with re-usable gravity meters to indicate being dropped or tipped over.

M. All main devices shall have the adjustments per 2.02.B.4.a. These adjustable settings shall also be provided on all devices feeding MCC’s or large motor loads.

N. The EOR shall provide a preliminary coordination study. The contractor and manufacturer of equipment installed shall provide a coordination study of the equipment used prior to installation. EOR shall provide breaker settings to the contractor.
3.02 SWITCHBOARD CONFIGURATION

A. Load balance switchboards to within 10% phase to phase.

B. Require 25% spare equipped spaces.

C. Switchboards rated over 1000 kVA shall be double-ended with tie breaker provisions. (Provide provisions for future kirk key interlock system.) Confirm correct operation and sequencing of system.

D. Specify spare lugs on load side of all main circuit breakers or switches. Capacity of lugs shall be full amperage rated up to a maximum size of 4 - #4/0 AWG.

3.03 TESTING

A. Require measurement of resistance of switchboard insulation after assembly is complete. Test voltage shall be 1000V. Acceptable minimum resistance 100 megohms all sections, phase to phase, and phase to ground with other phases grounded.

B. Provide ground fault testing in accordance with NETA ATS.

3.04 ADJUSTING AND CLEANING

A. Require the following:

1. Touch up scratched or marred surfaces to match original finish.

2. Adjust trip and time delay settings on adjustable devices. Indicate setting values on Drawings.

END OF SECTION 16425