



26 2413 – Switchboards

Page 1 of 3

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A. General:

1. Switchboards shall be U.L. listed and labeled.
2. Each switchboard shall have its own main disconnecting means. In most cases this will be a main breaker or fusible switch.
3. In general, switchboards shall be located in electrical equipment rooms or other equipment rooms designed for such.
4. These rooms shall be accessible by qualified personnel only and have corresponding signage stating such.
5. Switchboards shall not be located in corridors or other areas of public access.
6. Preferably installed on the first floor, not in the basement, especially for emergency distribution. Any switchboards that must be installed in the basement shall be installed on 8" concrete housekeeping pads to reduce risk of water damage due to flooding during and after construction. Basement flooding has been an issue on multiple BSU projects, especially during construction.

B. Approved Manufacturers:

1. Siemens
2. Square D
3. Eaton

C. Enclosure:

1. Dead front and totally enclosed construction, front access.
2. Constructed of #12 gauge minimum steel, reinforced with channels and angles as necessary.
3. Provided with space for future branches, bussed and equipped for the addition of breakers or fusible switch units.
4. Provided with Kirk type interlock arrangements if needed (e.g. Main-Tie-Main or generator backfeed)
5. Removable, hinged door arrangement and adequate means of access to equipment for inspection and servicing without removal from switchgear assembly.
6. Wiring troughs shall have removable, hinged access doors.

D. Branch Switches:

1. "QMB" type branches - quick make/quick break spring-loaded type, actuated by lockable handle.
2. Side hinged fuse access panels only.

E. Circuit Breakers:

1. All breakers (Main and Distribution) shall be fully rated.
2. Series connected rated systems are not acceptable.
3. Breakers shall have provisions for Lock Out Tag Out, capable of accepting padlocks.
4. Breakers over 225 Amps shall have electronic trip units

F. Construction:



26 2413 – Switchboards

Page 2 of 3

1. All bus bars to be plated copper.
 2. All bus bars shall be braced for maximum short circuit protection.
 3. All bus bar contacts and joints shall be plated.
 4. Provide supported bus extension to bus duct connections, whether incoming service or outgoing feeders. Cable connections to bus duct from switches are not desired.
 5. All distribution devices shall be group mounted.
 6. Show size and layout of bus on shop drawings.
 7. Main bus location shall be as required to clear conduit access space in board, as well as aisle space on walkthrough boards.
 8. The main section shall contain barriers, isolating it from the other sections of the switchboard to prevent arc flash or arc blast migration to other sections.
 9. Provide Unistrut or equal cable supports in boards.
 10. Provide copper bus bar pieces on switch load side for rear cable connection to lug, 600A size and above. (Main service switchboards only.)
 11. Horizontal (thru) bus shall be fully sized, extended and pre-drilled to accommodate future switchboard sections with standard splice plates.
 12. Blank compartments shall be bussed and equipped to accept future breakers
 13. Exterior Switchboards.
 - a. Shall be equipped with bottom closure plate
 - b. Shall be equipped with rodent barriers.
 - c. Shall be equipped with strip heaters with wiring labeled and extended out to terminal blocks.
 - d. Doors shall be hinged and pad-lockable.
 14. Provide provision for grounding phase bus bars to the ground bus. Adequate space shall be provided to attach a grounding cable set to the grounding balls provided on each bus
- G. Miscellaneous:
1. Provide engraved plastic one-line diagram on each board.
 2. Provide a label on the front of the switchboard indicating the C.T. and P.T. ratios.
 3. Provide a minimum 1/4" x 2" size cross sectional area copper equipment grounding bus in each switchboard and connect grounding bushings of feeder conduits.
 4. Allow 3'-0" minimum clear in rear of rear access boards.
 5. Allow 4'-0" clear in front of all boards.
- H. Main Service Switchboards (MDP):
1. Freestanding NEMA Class I – to and including 2000A.
 - a. 20" maximum depth
 2. Freestanding NEMA Class II or Class III over 2000A.
 - a. 32" minimum depth for front access
 - b. 48" minimum depth for side or rear access



26 2413 – Switchboards

Page 3 of 3

3. Provide special provisions for bus duct connections where the bus duct enters the switchboard
 4. 100,000A minimum or as calculated "withstand" bracing and components.
 5. Provide an ARMS arc reduction maintenance system or "maintenance mode" switch on switchboards 1000A and larger. NOTE: If the incident energy at the load side of the main is calculated at less than 8 cal/cm² the ARMS switch may be eliminated if allowed by code and with BSU Engineering prior approval.
- I. Sub distribution Switchboards (SDP):
1. Freestanding NEMA Class I – to and including 2000A.
 - a. 20" maximum depth
 2. 100,000A minimum or as calculated "withstand" bracing and components,
- J. Provide electronic metering in main switchboards.
1. Provide metering compartment that is separated from the rest of the switchboard.
 2. The metering shall be in a compartment isolated from any energized bus.
 - a. The metering compartment shall also contain a disconnect switch to disconnect power to the meter and it's components as well as a C.T. shorting block.
 - b. All components in the metering compartment shall have guarding in place to be considered "finger-safe" with respect to voltage above 50 volts.
 3. A 1" conduit shall be routed from the metering compartment to the exterior of the switchgear for RJ-45 patch cord from meter to communications jack. Install communications jack in close proximity to each metering compartment and wire back to MDF patch panel.
 4. All control, metering and instrumentation wiring shall be clearly identified and terminated on easily accessible terminal strips.
 5. The metering shall be connected as "cold sequence" unless specified otherwise.
 6. Metering compartment shall be factory wired and include an Ethernet ready meter for connection to the Owner's campus Ethernet network. The meter shall be Square D PM 8244 or PM 5563RD or identical re-labeled Square D meter by Siemens or Eaton. NOTE: This does not mean any Siemens or Eaton meter with equivalent functions or features, this means one of these exact Square D meters re-labeled as Siemens or Eaton. We MUST have Square D meters or re-labeled Square D meters in order to properly communicate via our existing Square D Power Monitoring Expert metering software via our campus Ethernet network.
- K. Other Instrumentation, Control Power and Power Supplies:
1. Any control power and power supplies shall be in a compartment isolated from any energized bus.
 - a. The compartment shall also contain a disconnect switch to disconnect power to the applicable components.
 - b. All components in the compartment shall have guarding in place to be considered "finger-safe" with respect to voltage above 50 volts.
- L. Warranty
1. Warranty shall be a minimum of 36 months from the date of Substantial Completion regardless of purchase, delivery or startup dates.