

SECTION 26 24 10 – SWITCHBOARDS

PART 1 - GENERAL

1.1. SUMMARY:

- A. This section includes design and performance requirements for electrical service entrance and distribution switchboards and switchgear for use on secondary distribution systems rated 600 VAC and below.
- B. Related Sections:
 - 1. Section 01701 - Building Systems Identification and Labeling

1.2. QUALITY ASSURANCE:

- A. Switchboards shall be Underwriters' Laboratories (UL) Labeled.

1.3. SUBMITTALS:

- A. Product Data: Submit product literature detailing electrical ratings, dimensions, materials of construction, mounting and installation details, applicable wiring diagrams, enclosure type and accessories.

1.4. SWITCHBOARDS – GENERAL REQUIREMENTS:

- A. Switchboards shall be designed so that switching and protective devices may be added or replaced without disturbing adjacent units or main bus connectors, and shall be so designed that circuits may be changed without drilling, machining or tapping the bus.
- B. Switchboards shall be of the dead-front type.
- C. Provide a minimum of one spare branch circuit breaker of each frame size used; design switchboard with at least 10% capacity for future breaker spaces.
- D. In no case shall the switchboard be directly attached to the building service transformer. A minimum 12-inch space with solid barrier is required to reduce the transfer of heat to the switchboard. Reduction of heat transfer may be accomplished with secondary throat or ventilated transition section.
- E. For new construction, provide space for the addition of future switchgear or switchboard sections.
- F. Switchboard Construction: Various types of switchboard and switchgear configuration are available. Consideration shall be made during the design phase to balance switchboard configuration and costs against expected reliability considerations. For initial Planning purposes, the following types of switchboard configuration shall be considered:
 - 1. General-purpose use within Academic, Support and Administrative Facilities: Front accessible switchboards with individual, fixed main circuit breakers and group-mounted, fixed distribution circuit breakers.

2. Research Facilities and Essential-Use Facilities: Draw-out style main (and tie) circuit breakers, and group-mounted, fixed distribution circuit breakers.

1.5. SWITCHBOARDS – DETAILED REQUIREMENTS:

A. Enclosures and Trim:

1. Enclosures shall include gutters and wireways of ample size for the feeders and outgoing circuits.
2. Enclosures shall be rated NEMA type-1 for dry interior areas, and type-12 (gasketed) for dusty and dirty indoor areas.
3. Provide switchboard gutters with hinged-type doors.
4. Provide rear accessible switchboards with hinged, lockable access covers.

B. Metering Compartments:

1. Switchboards requiring metering of the incoming power or submetering of outgoing circuits shall have meters installed within dedicated metering compartments.
2. Metering compartments shall be physically barriered and isolated from live bussing and circuit routing paths; provide with hinged front access door.
3. Metering compartments shall be pre-wired to include required control power transformer(s), current transformer connections and potential (voltage) transformer connections to the meters.
4. Metering shall be per Campus Metering requirements.

C. Bussing:

1. Switchboard bussing shall be bare, silver-plated or tin-plated copper. Bussing shall be full rated throughout the switchboard.
2. Neutral bussing shall be full rated, and electrically isolated from the cabinet.
3. Provide with a copper ground bus equal to a minimum of 1/2 the capacity of the phase bus. Ground bus shall be electrically bonded to the cabinet. Where isolated ground bus is required, provide an additional, ground bus, electrically isolated from both the neutral and ground bus.

D. Over-Current Protective Devices:

1. Overcurrent devices may include fixed molded case circuit breakers, draw-out type molded case circuit breakers, or draw-out type air-insulated “power” circuit breakers.
2. All circuit breakers shall be clearly and visibly marked for their ampere trip rating and "on", "off", and tripped positions. Designs where the trim must be removed to determine trip rating are not acceptable.
3. Fixed circuit breakers for frame sizes less than 250 amps shall be thermal-magnetic type trip units.
4. Fixed circuit breakers in frame sizes 250A and larger shall have adjustable, electronic trip units with long time, short time, instantaneous and time delay settings.
5. Service entrance circuit breakers and all circuit breakers rated over 400 amps shall have adjustable, electronic trip units with long time, short time, instantaneous, ground and time delay settings.

6. Where new circuit breakers are to be installed within existing switchboards, they shall be listed for use with the existing switchboard type, and of sufficient short circuit rating for the application.
- E. Double-ended switchboards:
1. Tie breakers shall be key-interlocked with the main secondary disconnecting means, requiring the spare key to parallel sections.
 2. Tie breakers shall be manually operated; avoid use of automatic changeover schemes.
 3. Double-ended switchboards have multiple connections of system neutral and grounds; provide suitable ground-fault detection and protection scheme to prevent nuisance tripping when operating under all possible scenarios.
 4. Connect main feeders to separate incoming power supplies.
- F. Interrupting Capacity:
1. Switchboard bussing, main and branch circuit breakers shall be rated for the minimum fault current level available on the system.
 2. Switchboards shall be fully rated, versus series rated.
 3. Where fault current information is not readily available, the following ratings shall apply:
 - a. 120-208/240 VAC switchboards shall be rated for 42,000 AIC minimum.
 - b. 277/480 VAC switchboards rated 2,000 amps and less shall be rated for 42,000 AIC minimum.
 - c. 277/480 VAC switchboards rated over 2,000 amps shall be rated for 65,000 AIC minimum.

PART 2 - PRODUCTS

2.1. MANUFACTURERS:

- A. Switchboard manufacturer shall generally match the brand of installed building electrical distribution equipment.
- B. Manufacturers:
1. Square D
 2. Siemens

PART 3 - EXECUTION

3.1. INSTALLATION – GENERAL:

- A. Installation of switchboards shall be per the NEC, the manufacturer's instructions and applicable NECA installation requirements.
- B. Where new circuit breakers are installed or added to existing switchboards, update the existing circuit directory with a new typewritten label(s) to clearly identify the load(s) served.

3.2. INSTALLATION – DETAILED:

- A. Mount switchboards on concrete housekeeping pads.
- B. Calibrate adjustable-trip circuit breakers per Engineer’s instructions or breaker coordination study.
- C. All unused spaces shall have filler plates installed.
- D. Each circuit breaker shall have a neatly-typed label installed, clearly identifying the load served.
- E. Provide and install a plastic engraved nameplate for each switchboard detailing the following: switchboard designation; operating voltage; Source and circuit number of switchboard supply (for disconnection and isolation).
- F. Visual and Mechanical Inspection: Inspect completed switchboards for physical damage, proper alignment, anchorage and grounding. Recheck proper installation and tightness of connections.
- G. Switchboards shall be left clean, with all debris removed from gutters and enclosures.
- H. All scratches and digs shall be repainted to match the finish paint color.

END OF SECTION