

SECTION 26 24 00
SWITCHBOARDS AND DISTRIBUTION PANEL BOARDS
Design Standard

PART 1 GENERAL

1.1 PURPOSE

This design standard has the purpose of providing switchboards and distribution panels with a level of quality which meets the requirements throughout the San Mateo County Community College District for all renovation and new building projects.

PART 2 PRODUCTS

2.1 Design and specify switchboards, distribution panel boards, and branch panel boards for all power and lighting distribution sources to individual buildings and facilities requiring voltages under 600V. All switchboards to meet the following requirements based on Code requirements and industry standard of design and care:

- A. Panels shall be provided with "door in door" construction.
- B. Install equipment in conformance with work space requirements of CEC.
- C. Locate equipment in rooms or spaces dedicated to such equipment.
- D. Design and install with power monitoring capability.
- E. Enclosures:
 - 1. Free standing, dead front with front accessibility.
 - 2. Framework constructed of formed, code gauge steel, rigidly welded and bolted together to support coverplates, bussing, and component devices during shipment and installation. Bolt steel base channels to the frame to rigidly support the entire shipping section for moving on rollers and floor mounting.
 - 3. Provide each section with individually removable top plate and open bottom to permit installation and termination of service and feeder raceways.
 - 4. Removable Front Covers: Screw attached.
 - 5. Provide removable hinge pins on hinged doors.
 - 6. Paint interior and exterior surfaces. Medium light gray finish, applied by electro-deposition process over an iron phosphate pretreatment.
 - 7. All panel boards, switchboards, motor control centers and other components of electrical systems shall be Nema 1 when enclosed within a building. Except when subjected to moisture, the housing shall be Nema 3R.
 - 8. All floor standing equipment shall be mounted on a minimum 4" reinforced concrete pad. All panel boards shall be provided with a minimum of 30% expansion capacity.
- F. Bussing:
 - 1. Material: Plated copper.
 - 2. Ground Bus: Full length of switchboard, 50 percent of phase bus capacity.
 - 3. Neutral Bus: 100 percent rated, full length of switchboard.
- G. Provide fully rated integrated equipment rating greater than the available fault current. Series rated switchboards are not acceptable. Coordinate with serving electric utility.
- H. Lugs: Compression type rated for both aluminum and copper conductors.
- I. Molded Case Circuit Breakers are to be NEMA AB 1, with standard frame sizes, trip ratings, and number of poles, and interrupting capacity to meet available fault currents. Molded-case circuit breakers are also identified as:
 - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250A and larger.
 - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

3. Electronic Trip Unit Circuit Breakers: 400 amps and above; RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time adjustments.
 - d. Ground-fault pickup level, time delay, and I^2t response.
 4. Current-Limiting Circuit Breakers: Frame sizes 400A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 5. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.
- J. Enclosed, Insulated-Case Circuit Breaker: Fixed mounting, manually closed, fully rated, encased-power circuit breaker with interrupting capacity rating to meet available fault current.
1. Two-step, stored energy closing.
 2. Microprocessor-based trip units with interchangeable rating plug, LED trip indicators, and the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time adjustments.
 - d. Ground-fault pickup level, time delay, and I^2t response.
 3. Remote trip indication and control capability.
 4. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
 5. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.

2.2 All lighting and appliance branch panelboards to meet the following requirements based on Code requirements and industry standard of design and care:

- A. Enclosures:
1. Flush Panelboards Rated 400 Amp or Less: Maximum enclosure depth, 5-3/4-inches.
 2. Wiring Gutter Size: 5 inches at sides, 6 inches top and bottom.
 3. Finish: Galvanized steel constructed in accordance with UL 50 requirements. Front shall have ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
 4. Hinged door with door-in-door construction, flush lift latch and lock, two keys per panel. Key panelboards alike.
- B. Interior:
1. Copper bar with suitable electroplating (tin) for corrosion control at connection.
 2. Provide copper ground bar to accommodate specified terminal lugs.
 3. Predrill bus for bolt-on type circuit breakers.
 4. Provide double lugs or landing pads for feed through feeders.
 5. Provide feed through feeder lugs for field connection of multi-section flush panel sections, where applicable.
 6. When distribution panel is feeding isolated ground circuits, provide isolated ground bar, insulated from panelboard enclosure, to accommodate specified terminal lugs.
 7. Provide fully rated integrated equipment rating greater than the available fault current. Coordinate available fault current with serving electric utility. Minimum rating is 10,000 amps.
 8. Lugs: Compression type rated for both aluminum and copper conductors.
 9. Provide interior wiring diagram, neutral wiring diagram, UL listed label and short circuit current rating on the interior or in a booklet format inserted in a sleeve inside the panel cover.
- C. Main Circuit Breaker, Where Applicable:

1. UL listed to accept solid or stranded, aluminum or copper conductors. Lugs: suitable for 90C rated wire sized according to the 75C temperature rating per CEC.
- D. Branch Circuit Breakers:
1. Bolt-on type bus connectors.
 2. UL listed to accept solid or stranded, aluminum or copper conductors. Lugs: suitable for 90C rated wire sized according to the 75C temperature rating per CEC.
 3. UL listed for use with the following factory installed accessories: shunt trip, auxiliary switch and alarm switch.
 4. UL listed with the following ratings:
 - a. 15 to 125 amp breakers: Heating, Air Conditioning, and Refrigeration (HACR).
 - b. 15 to 30 amp breakers: High Intensity Discharge (HID) lighting.
 - c. 15 to 20 amp breakers: Switch Duty (SWD).
 5. When indicated on drawings, provide 200 percent rated copper neutral assembly.
 6. When indicated on drawings, provide an isolated ground bus in addition to the equipment ground bus.
- 2.3 All power distribution panelboards to meet the following requirements based on Code requirements and industry standard of design and care:
- A. Enclosures:
1. Provide boxes with removable blank end walls and interior mounting studs. Provide interior support bracket for ease of interior installation.
 2. Finish: Galvanized steel constructed in accordance with UL 50 requirements. Front shall have ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
 3. Hinged door with door-in-door construction, flush lift latch and lock, two keys per panel. Key panelboards alike.
- B. Interior:
1. Copper bar with suitable electroplating (tin) for corrosion control at connection.
 2. Provide copper ground bar to accommodate specified terminal lugs.
 3. Panelboard interior: three flat bus bars stacked and aligned vertically with glass reinforced polyester insulators laminated between phases. Molded polyester insulators shall support and provide phase isolation to entire length of bus.
 4. Predrill bus for bolt-on type circuit breakers.
 5. Provide double lugs or landing pads for feed through feeders.
 6. Provide feed through feeder lugs for field connection of multi-section flush panel sections.
 7. When distribution panel is feeding isolated ground circuits, provide isolated ground bar, insulated from panelboard enclosure, to accommodate specified terminal lugs.
 8. Fully equip unused spaces for future devices, including manufacturer required connectors and mounting hardware.
 9. Provide fully rated integrated equipment rating greater than the available fault current. See drawings for available fault current. Coordinate available fault current with serving electric utility. Minimum rating is 10,000 amps.
 10. Lugs: Compression type rated for both aluminum and copper conductors.
 11. Provide interior wiring diagram, neutral wiring diagram, UL listed label and short circuit current rating on the interior or in a booklet format inserted in a sleeve inside the panel cover.
 12. When indicated on drawings, provide 200 percent rated copper neutral assembly.
 13. When applicable, provide an isolated ground bus in addition to the equipment ground bus.
- 2.4 All instrumentation equipment to meet the following requirements based on Code requirements and industry standard of design and care:
- A. (Comment: is separate monitor necessary with monitoring system?)

- B. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems and with the following features:
- C. Switch-selectable digital display of the following values with maximum accuracy tolerances as indicated:
 - 1. Phase Currents, Each Phase: Plus or minus 1 percent.
 - 2. Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
 - 3. Phase-to Neutral Voltages, Three Phase: Plus or minus 1 percent.
 - 4. Megawatts: Plus or minus 2 percent.
 - 5. Megavars: Plus or minus 2 percent.
 - 6. Power Factor: Plus or minus 2 percent.
 - 7. Frequency: Plus or minus 0.5 percent.
 - 8. Megawatt Demand: Plus or minus 2 percent; demand interval programmable from 5 to 60 minutes.
 - 9. Accumulated Energy, Megawatt Hours: Plus or minus 2 percent. Accumulated values unaffected by power outages up to 72 hours.

2.5 The following are specific requirements as outlined by Campus:

- A. Skyline: all exterior equipment shall be stainless steel, aluminum, and composite; or hot dipped galvanized where other metals or composite materials are not available.
 - 1. Panels and sub-panels: GE, Challenger or equivalent
 - 2. Switchgear: GE, Challenger or equivalent
- B. Cañada & CSM
 - 1. Panels and sub-panels: GE or equivalent
 - 2. Switchgear: GE or equivalent Transformers shall be dry-type, with copper windings (no aluminum).

2.6 APPROVED MANUFACTURERS

- A. Eaton Electrical
- B. General Electric
- C. Siemens
- D. Schneider Electric
- E. IEM

PART 3 EXECUTION

3.1 SUBSTITUTES ALLOWED?

Yes, if performance and quality equivalency can be evidenced.

3.2 ASSOCIATED DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

- A. Division 26 Design Standards and Construction Specifications
- B. 26 27 13 Electricity Metering and Monitoring

END OF SECTION