required to be calculated and marked on service equipment in other than dwelling units, not all switchboards, switchgear, and panelboards are installed as service equipment or in other than dwelling units. The available fault current at the point where the equipment is installed must be determined to ensure that the SCCR is adequate where not installed as service equipment. It is also important to mark available fault current and when it was determined to ensure that the equipment continues to comply with 408.6 after installation modifications or expansions.

See also

110.21(B) for label durability considerations

110.24 for requirement at service equipment in other than dwellings

408.7 Unused Openings. Unused openings for circuit breakers and switches shall be closed using identified closures, or other approved means that provide protection substantially equivalent to the wall of the enclosure.

The requirement of 110.12(A) for closing unused openings such as knockouts (other than those provided for equipment mounting or drainage) applies to all electrical enclosures, including panelboard cabinets, switchgear, and switchboard enclosures. An unused opening might exist because of a renovation or an alteration of existing equipment. The requirement of this section is for closing unused openings for a circuit breaker where none is installed. Together these two requirements are necessary to restore the electrical equipment enclosure integrity to a condition that minimizes the possibility of an escaping arc, spark, or molten metal igniting surrounding combustible material and minimizes the potential for accidental contact with live parts.

N **408.9 Replacement Panelboards.** Replacement panelboards shall be permitted to be installed in existing enclosures in accordance with 408.9(A) or (B).

N **(A) Panelboards Listed for the Specific Enclosure.** If the replacement panelboard is listed for the specific enclosure identified by either catalog number or dimensional information, the panelboard shall be permitted to maintain its short-circuit current rating.

N **(B) Panelboards Not Listed for the Specific Enclosure.** If the available fault current is greater than 10,000 amperes, the completed work shall be field labeled. If the available fault current is 10,000 amperes or less, the replacement panelboard shall be identified for the application. Any previously applied listing marks on the cabinet that pertain to the panelboard shall be removed.

Part II. Switchboards and Switchgear

408.16 Switchboards and Switchgear in Damp or Wet Locations. Switchboards and switchgear in damp or wet locations shall be installed in accordance with 312.2.

408.17 Location Relative to Easily Ignitible Material. Switchboards and switchgear shall be placed so as to reduce to a minimum the probability of communicating fire to adjacent combustible materials. Where installed over a combustible floor, suitable protection thereto shall be provided.

Where flooring is combustible, one means of complying with this requirement is to form and attach a piece of sheet steel or other suitable noncombustible material to the floor under the electrical equipment.

408.18 Clearances.

(A) From Ceiling. For other than a totally enclosed switchboard or switchgear, a space not less than 900 mm (3 ft) shall be provided between the top of the switchboard or switchgear and any combustible ceiling, unless a noncombustible shield is provided between the switchboard or switchgear and the ceiling.

(B) Around Switchboards and Switchgear. Clearances around switchboards and switchgear shall comply with the provisions of 110.26.

Sufficient access and working space permit safe operation and maintenance of switchboards and switchgear. Table 110.26(A)(1) indicates minimum working clearances from 0 to 1000 volts.

See also

Article 495 and **Table 110.34(A)** for switchboards and switchgear rated over 1000 volts

(C) Connections. Each section of equipment that requires rear or side access to make field connections shall be so marked by the manufacturer on the front. Section openings requiring rear or side access shall comply with 110.26. Load terminals for field wiring shall comply with 408.18(C)(1), (C)(2), or (C)(3) as applicable.

(1) Equipment Grounding Conductors. Load terminals for field wiring shall be so located that it is not necessary to reach across uninsulated ungrounded bus in order to make connections.

(2) Grounded Circuit Conductors. Where multiple branch or feeder grounded circuit conductor load terminals for field wiring are grouped together in one location, they shall be so located that it is not necessary to reach across uninsulated ungrounded bus, whether or not energized, in order to make connections.

Where only one branch or feeder set of load terminals for field wiring are grouped with its associated ungrounded load terminals, they shall be so located that it is not necessary to reach across energized uninsulated bus including other branch or feeder bus in order to make connections. Bus on the line side of service, branch, or feeder disconnects is considered energized with respect to its associated load side circuits.

(3) Ungrounded Conductors. Load terminals for ungrounded conductors shall be so located that it is not necessary to reach across energized uninsulated bus in order to make connections. Bus on the line side of service, branch, or feeder disconnects is considered energized with respect to its associated load side circuits.