**408.19 Conductor Insulation.** An insulated conductor used within a switchboard or switchgear shall be listed, shall be flame retardant, and shall be rated not less than the voltage applied to it and not less than the voltage applied to other conductors or busbars with which it may come into contact.

**408.20 Location of Switchboards and Switchgear.** Switchboards and switchgear that have any exposed live parts shall be located in permanently dry locations and then only where under competent supervision and accessible only to qualified persons. Switchboards and switchgear shall be located such that the probability of damage from equipment or processes is reduced to a minimum.

**408.22 Grounding of Instruments, Relays, Meters, and Instrument Transformers on Switchboards and Switchgear.** Instruments, relays, meters, and instrument transformers located on switchboards and switchgear shall be grounded as specified in 250.170 through 250.178.

**408.23 Power Monitoring and Energy Management Equipment.** The requirements of 312.8(B) shall apply.

## Part III. Panelboards

**408.30 General.** All panelboards shall have a rating not less than the minimum feeder capacity required for the load calculated in accordance with Part III, IV, or V of Article 220, as applicable.

Many panelboards are suitable for use as service equipment and are so marked by the manufacturer. Listed panelboards are used with copper conductors, unless they are marked to indicate which terminals are suitable for use with aluminum conductors. Such marking must be independent of any marking on terminal connectors and must appear on a wiring diagram or other readily visible location. If all terminals are suitable for use with aluminum conductors as well as with copper conductors, the panelboard is marked "Use Copper or Aluminum Wire." A panelboard using terminals or main or branch-circuit units individually marked "AL-CU" is marked "Use Copper or Aluminum Wire" or "Use Copper Wire Only." The latter marking indicates that wiring space or other factors make the panelboard unsuitable for aluminum conductors.

Unless a panelboard is marked to indicate otherwise, the terminations are based on the use of 60°C ampacities for wire sizes 14 AWG through 1 AWG and 75°C ampacities for wire sizes 1/0 AWG and larger.

**See also**

**110.14(C)** for temperature limitations of connections and how they affect conductor ampacity

The term *lighting and appliance branch-circuit panelboards* and the term *power panelboards* are no longer used. In addition, the requirement for a maximum of 42 overcurrent devices applies only with Exception No. 1 of 408.36. All panelboards need a single overcurrent device that protects the panelboard bus unless either of the exceptions of 408.36 applies.

**408.36 Overcurrent Protection.** In addition to the requirement of 408.30, a panelboard shall be protected by an overcurrent protective device having a rating not greater than that of the panelboard. This overcurrent protective device shall be located within or at any point on the supply side of the panelboard.

If a panelboard is required to have overcurrent protection, such protection can be provided by an overcurrent protective device (OCPD) in the panelboard or by an OCPD protecting the conductors that supply the panelboard. Exhibit 408.2 shows a panelboard with a main circuit breaker and provisions for inserting 60 circuit breakers. Exhibit 408.3 illustrates overcurrent protection for the panelboard feeders having a rating not greater than the rating of the panelboard. In either case, the OCPD rating is not permitted to exceed the panelboard rating. For example, a feeder protected by a 200-ampere OCPD supplies two main lugs only (MLO) panelboards, each with a 225-ampere rating. Because the panelboard is large enough to supply the calculated load and the OCPD protecting the feeder does not exceed the panelboard rating, an individual OCPD in the panelboard is not required.

*Exception No. 1: Individual protection shall not be required for a panelboard protected by two main circuit breakers or two sets of fuses in other than service equipment, having a combined rating not greater than that of the panelboard. A*

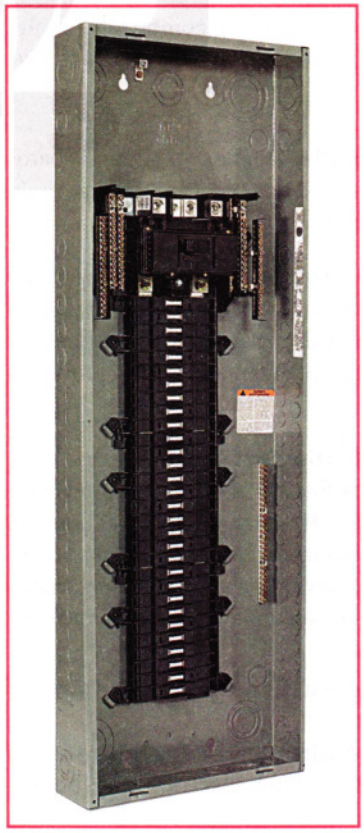

EXHIBIT 408.2 A panelboard with main circuit breaker disconnect suitable for use as service equipment. *(Courtesy of Schneider Electric)*