

motor or combination of motor and non-motor loads, the rating or setting of the overcurrent protective device shall be based on 430.52 and 430.53, as applicable.

409.22 Short-Circuit Current Rating.

(A) Installation. An industrial control panel shall not be installed where the available fault current exceeds its short-circuit current rating as marked in accordance with 409.110(4).

(B) Documentation. If an industrial control panel is required to be marked with a short-circuit current rating in accordance with 409.110(4), the available fault current at the industrial control panel and the date the available fault current calculation was performed shall be documented and made available to those authorized to inspect, install, or maintain the installation.

409.30 Disconnecting Means. Disconnecting means that supply motor loads shall comply with Part IX of Article 430.

409.60 Bonding. Industrial control panels shall be grounded and bonded in accordance with 409.60(A) and (B).

N (A) Grounding. An equipment grounding conductor sized in accordance with 250.122 shall be connected to an equipment grounding bus or to an equipment grounding termination point provided in a single-section industrial control panel.

N (B) Bonding. Multisection industrial control panels shall be bonded together using an equipment bonding jumper sized in accordance with 250.102(D).

N 409.70 Surge Protection. Safety circuits for personnel protection that are subject to damage from surge events shall have surge protection installed within or immediately adjacent to the control panel.

Part III. Construction Specifications

Part III provides the AHJ with a set of requirements that can be used as a benchmark for approval of a field-constructed control panel.

409.100 Enclosures. Table 110.28 shall be used as the basis for selecting industrial control panel enclosures for use in specific locations other than hazardous (classified) locations. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that may occur within the enclosure or enter via the conduit or unsealed openings.

Δ 409.102 Busbars. Industrial control panels utilizing busbars shall comply with 409.102(A) and (B).

(A) Support and Arrangement. Busbars shall be protected from physical damage and be held firmly in place.

(B) Phase Arrangement. The phase arrangement on 3-phase horizontal common power and vertical buses shall be A, B, C from front to back, top to bottom, or left to right, as viewed from the front of the industrial control panel. The B phase shall be that phase having the higher voltage to ground on 3-phase, 4-wire, delta-connected systems. Other busbar arrangements shall be permitted for additions to existing installations, and the phases shall be permanently marked.

409.104 Wiring Space.

(A) General. Industrial control panel enclosures shall not be used as junction boxes, auxiliary gutters, or raceways for conductors feeding through or tapping off to other switches or overcurrent devices or other equipment, unless the conductors fill less than 40 percent of the cross-sectional area of the wiring space. In addition, the conductors, splices, and taps shall not fill the wiring space at any cross section to more than 75 percent of the cross-sectional area of that space.

(B) Wire Bending Space. Wire bending space within industrial control panels for field wiring terminals shall be in accordance with the requirements in 430.10(B).

409.106 Spacings. Spacings in feeder circuits between uninsulated live parts of adjacent components, between uninsulated live parts of components and grounded or accessible non-current-carrying metal parts, between uninsulated live parts of components and the enclosure, and at field wiring terminals shall be as shown in Table 430.97(D).

Exception: Spacings shall be permitted to be less than those specified in Table 430.97(D) at circuit breakers and switches and in listed components installed in industrial control panels.

409.108 Service Equipment. Where used as service equipment, each industrial control panel shall be of the type that is suitable for use as service equipment.

Where a grounded conductor is provided, the industrial control panel shall be provided with a main bonding jumper, sized in accordance with 250.28(D), for connecting the grounded conductor, on its supply side, to the industrial control panel equipment ground bus or equipment ground terminal.

Δ 409.110 Marking. An industrial control panel shall have permanent markings that are visible after installation. The markings in 409.110(2) and (3) shall be attached to the outside of the enclosure. The markings in 409.110(1), (4), (5), (6), and (7) shall be attached to either the inside or outside of the enclosure. The following markings shall be included:

- (1) Manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified.