Part XIII. Grounding — All Voltages

430.241 General. Part XIII specifies the grounding of exposed non–current-carrying metal parts, likely to become energized, of motor and motor controller frames to limit voltage to ground in the event of accidental contact between energized parts and frames. Insulation, isolation, or guarding are suitable alternatives to grounding of motors under certain conditions.

430.242 Stationary Motors. The frames of stationary motors shall be grounded under any of the following conditions:

(1) Where supplied by metal-enclosed wiring
(2) Where in a wet location and not isolated or guarded
(3) If in a hazardous (classified) location
(4) If the motor operates with any terminal at over 150 volts to ground

Where the frame of the motor is not grounded, it shall be permanently and effectively insulated from the ground.

430.243 Portable Motors. The frames of portable motors that operate over 150 volts to ground shall be guarded or grounded.

Informational Note No. 1: See 250.114(4) for grounding of portable appliances in other than residential occupancies.
Informational Note No. 2: See 250.119(D) for color of equipment grounding conductor in flexible cords.

Exception No. 1: Listed motor-operated tools, listed motor-operated appliances, and listed motor-operated equipment shall not be required to be grounded where protected by a system of double insulation or its equivalent. Double-insulated equipment shall be distinctively marked.

Exception No. 2: Listed motor-operated tools, listed motor-operated appliances, and listed motor-operated equipment connected by a cord and attachment plug other than those required to be grounded in accordance with 250.114.

430.244 Motor Controllers. Motor controller enclosures shall be connected to the equipment grounding conductor regardless of voltage. Motor controller enclosures shall have means for attachment of an equipment grounding conductor termination in accordance with 250.8.

Exception: Enclosures attached to ungrounded portable equipment shall not be required to be grounded.

430.245 Method of Grounding. Connection to the equipment grounding conductor shall be done in accordance with Part VI of Article 250.

Most motors are subject to vibration. This could require that the wiring to motors that are fixed be installed with a short section of liquidtight flexible metal conduit, liquidtight flexible nonmetallic conduit, or flexible metal conduit to the motor terminal housing to minimize the impact of the vibration. Under these conditions of use, a wire-type equipment grounding conductor (EGC) must be installed (see 250.118).

(A) Grounding Through Terminal Housings. Where the wiring to motors is metal-enclosed cable or in metal raceways, junction boxes to house motor terminals shall be provided, and the armor of the cable or the metal raceways shall be connected to them in accordance with 250.96(A) and 250.97.

Δ **(B) Separation of Junction Box from Motor.** The junction box required by 430.245(A) shall be permitted to be separated from the motor by not more than 1.8 m (6 ft) if the leads to the motor are stranded conductors within Type AC cable, interlocked metal tape Type MC cable where listed and identified in accordance with 250.118(A)(10)b., or armored cord or are stranded leads enclosed in liquidtight flexible metal conduit, flexible metal conduit, intermediate metal conduit, rigid metal conduit, or electrical metallic tubing not smaller than metric designator 12 (trade size ⅜), with the armor or raceway being connected both to the motor and to the box.

Liquidtight flexible nonmetallic conduit and rigid nonmetallic conduit shall be permitted to enclose the leads to the motor if the leads are stranded and the required equipment grounding conductor is connected to both the motor and to the box.

Where stranded leads are used, protected as specified above, each strand within the conductor shall be not larger than 10 AWG and shall comply with other requirements of this *Code* for conductors to be used in raceways.

(C) Grounding of Motor Controller-Mounted Devices. Instrument transformer secondaries and exposed non–current-carrying metal or other conductive parts or cases of instrument transformers, meters, instruments, and relays shall be grounded in accordance with 250.170 through 250.178.

Δ Part XIV. Tables

Tables 430.248 through 430.250 reflect the typical and most used 4- and 2-pole induction motors in use.