NEC 2011 Code Changes

Articles 430.30-490.74

CHANGES FROM 2008 TO 2011 CODE ARE IN RED

Chapter 4 – Equipment for General Use

ARTICLE – 430 Motors, Motor Circuits, and Controllers

VI. Motor Control Circuits

430.74 Electrical Arrangement of Control Circuits (NEC 2008)

Where one side of the motor control circuit is grounded, the motor control circuit shall be arranged so that an accidental ground in the control circuit remote from the motor controller will (1) not start the motor and (2) not bypass manually operated shutdown devices of automatic safety shut-down devices.

430.74 Electrical Arrangement of Control Circuits (NEC 2011)

Where conductor of the motor control circuit is grounded, the motor control circuit shall be arranged so that a ground fault in the control circuit remote from the motor controller will (1) not start the motor and (2) not bypass manually operated shutdown devices of automatic safety shut-down devices.

430.75 Disconnection (NEC 2008)

(A) General

Exception #2: The motor control circuit disconnecting means will be allowed to be remote from the motor controller power supply disconnecting means where the opening of one or more motor control circuit disconnecting means may result in potentially unsafe conditions for personnel or property and the conditions of items (a) and (b) of exception # 1 are adhered to.

430.75 Disconnection (NEC 2011)
(A) General

Exception #2: The motor control circuit disconnecting means will be allowed to be remote from the motor controller power supply disconnecting means where the opening of one or more motor control circuit disconnecting means is capable of resulting in potentially unsafe conditions for personnel or property and the conditions of items (a) and (b) of exception # 1 are adhered to.

VII. Motor Controllers

430.81 General (NEC 2008)

Part VII is intended to require suitable controllers for all motors.

(B) Portable Motor of 1/3 Horsepower or Less

For a portable motor rated at 1/3 hp or less, the controller will be allowed to be an attachment plug and receptacle.

430.81 General (NEC 2011)

Part VII is intended to require suitable controllers for all motors.

(B) Portable Motor of 1/3 Horsepower or Less

For a portable motor rated at 1/3 hp or less, the controller will be allowed to be an attachment plug and receptacle or cord connector.

VIII. Motor Control Centers

430.94 Overcurrent Protection (NEC 2008)

Motor control centers will be provided with overcurrent protection according to Parts I, II, and IX of Article 240. The ampere rating or setting of the overcurrent protective device will not exceed the rating of the common power bus. This protection will be provided by (1) an overcurrent protective device located ahead of the motor control canter or (2) a main overcurrenrt protective device located within the motor control canter.
430.94 Overcurrent Protection (NEC 2011)

Motor control centers will be provided with overcurrent protection according to Parts I, II, and VIII of Article 240. The ampere rating or setting of the overcurrent protective device will not exceed the rating of the common power bus. This protection will be provided by (1) an overcurrent protective device located ahead of the motor control canter or (2) a main overcurrent protective device located within the motor control canter.

IX. Disconnecting Means

430.109 Type (NEC 2008)

(F) Cord-and-Plug Connected Motors

For a cord-and-plug-connected motor, a horsepower-rated attachment plug and receptacle having ratings no less than the motor ratings will be allowed to serve as the disconnecting means. A horsepower-rated attachment plug and receptacle will not be required for a cord-and-plug-connected appliance according to section 422.33, a room air conditioner according to section 440.63, or a portable motor rated 1/3 hp or less.

430.109 Type (NEC 2011)

(F) Cord-and-Plug Connected Motors

For a cord-and-plug-connected motor, a horsepower-rated attachment plug and receptacle, flanged surface inlet and cord connector, or attachment plug and cord connector having ratings no less than the motor ratings will be allowed to serve as the disconnecting means. A horsepower-rated attachment plugs, flanged surface inlets, and receptacles, or cord connectors, will not be required for a cord-and-plug-connected appliance according to section 422.33, room air conditioners according to section 440.63, or a portable motor rated 1/3 hp or less.

X. Adjustable-Speed Drive Systems
430.122 Conductors – Minimum Size and Ampacity (NEC 2008)

(A) Branch/Feeder Circuit Conductors

Circuit conductors supplying power conversion equipment included as part of an adjustable-speed drive system will have an ampacity no less than 125 percent of the rated input to the power conversion equipment.

(B) Bypass Device

For an adjustable speed drive system that utilizes a bypass device, the conductor ampacity will not be less than required by section 430.6. The ampacity of circuit conductors supplying power conversion equipment included as part of an adjustable-speed drive system that utilizes a bypass device will be the larger of either of the following

1. 125 percent of the rated input to the power conversion equipment.

430.122 Conductors – Minimum Size and Ampacity (NEC 2011)

(A) Branch/Feeder Circuit Conductors

Circuit conductors supplying power conversion equipment included as part of an adjustable-speed drive system will have an ampacity no less than 125 percent of the rated input to the power conversion equipment.

Further Information: Power conversion equipment can have multiple power ratings and corresponding input currents.

(B) Bypass Device

For an adjustable speed drive system that utilizes a bypass device, the conductor ampacity will not be less than required by section 430.6. The ampacity of circuit conductors supplying power conversion equipment included as part of an adjustable-speed drive system that utilizes a bypass device will be the larger of either of the following
(1) 125 percent of the rated input *current* to the power conversion equipment.

XI. Over 600 Volts, Nominal

430.225 Motor-Circuit Overcurrent Protection (NEC 2008)

(A) General

Exception: Where a motor is vital to operation of the plant and the motor should operate to failure if necessary to prevent a greater hazard to the persons, the sensing device will be allowed to be connected to a supervised annunciator or alarm instead of interrupting the motor circuit.

(B) Overload Protection

(1) Type of Overload Device

Each motor will be protected against dangerous heating due to motor overloads and failure to start by a thermal protector integral with the motor or external current-sensing devices, or both.

430.225 Motor-Circuit Overcurrent Protection (NEC 2011)

(A) General

Exception: Where a motor is *critical to an operation and* the motor should operate to failure if necessary to prevent a greater hazard to the persons, the sensing device will be allowed to be connected to a supervised annunciator or alarm instead of interrupting the motor circuit.

(B) Overload Protection

(1) Type of Overload Device

Each motor will be protected against dangerous heating due to motor overloads and failure to start by a thermal protector integral with the motor or external current-sensing devices, or both.

*Protective device settings for each motor circuit will be determined under engineering supervision.*

XIII. Grounding – All Voltages
430.245 Method of Grounding (NEC 2008)

(A) Grounding Through Terminal Housings

Where the wiring to fixed motors is metal-enclosed cable or in metal raceways, junction boxes to house motor terminals will be provided, and the armor of the cable or the metal raceways will be connected to them in the manner specified in Article 250.

430.245 Method of Grounding (NEC 2011)

(A) Grounding Through Terminal Housings

Where the wiring to motors is metal-enclosed cable or in metal raceways, junction boxes to house motor terminals will be provided, and the armor of the cable or the metal raceways will be connected to them in the manner specified in section 250.96(A) and 250.97.

ARTICLE 440 – Air-Conditioning and Refrigerating Equipment

I. General

440.6 Ampacity Rating (NEC 2008)

The size of conductors for equipment covered by this article will be selected from Table 310.16 through Table 310.19 or calculated according to section 310.15 as applicable. The required ampacity of conductors and rating of equipment will be determined according to section 440.6(A) and 440.6(B).

440.6 Ampacity Rating (NEC 2011)

The size of conductors for equipment covered by this article will be selected from Table 310.15(B)(16) through Table 310.15(B)(9) or calculated according to section 310.15 as applicable. The required ampacity of conductors and rating of equipment will be determined according to section 440.6(A) and 440.6(B).

IV. Branch-Circuit Conductors
440.34 Combination Load (NEC 2008)
Conductors supplying a motor-compressor load in addition to a lighting or appliance load as calculated from Article 220 and other applicable articles will have an ampacity sufficient for the lighting or appliance load plus the required ampacity for the motor-compressor load determined according to section 440.33 or, for a single motor-compressor, according to section 440.32.

440.34 Combination Load (NEC 2011)
Conductors supplying a motor-compressor load in addition to other loads as calculated from Article 220 and other applicable articles will have an ampacity sufficient for other loads plus the required ampacity for the motor-compressor load determined according to section 440.33 or, for a single motor-compressor, according to section 440.32.

VI. Motor-Compressor and branch-Circuit Overload Protection

440.55 Cord-and-Attachment-Plug-Connected Motor-Compressors and Equipment on 15- or 20-Ampere Branch Circuits (NEC 2008)

(B) Attachment Plug and Receptacle Rating
The rating of the attachment plug and receptacle will not exceed 20 amperes at 125 volts or 15 amperes at 250 volts.

440.55 Cord-and-Attachment-Plug-Connected Motor-Compressors and Equipment on 15- or 20-Ampere Branch Circuits (NEC 2011)

(B) Attachment Plug and Receptacle or Cord Connector Rating
The rating of the attachment plug and receptacle or cord connector will not exceed 20 amperes at 125 volts or 15 amperes at 250 volts.

440.63 Disconnecting Means (NEC 2008)
An attachment plug and receptacle will be allowed to serve as the disconnecting means for a single-phase room air conditioner rated 250 volts or less if (1) the manual controls on the room air conditioner are easily accessed and located within 6 ft. of the floor or (2) an approved manually operable means of disconnect is installed in an easily accessed location within sight from the room air conditioner.

**440.63 Disconnecting Means (NEC 2011)**

An attachment plug and receptacle or cord connector will be allowed to serve as the disconnecting means for a single-phase room air conditioner rated 250 volts or less if (1) the manual controls on the room air conditioner are easily accessed and located within 6 ft. of the floor or (2) an approved manually operable means of disconnect is installed in an easily accessed location within sight from the room air conditioner.

**ARTICLE 445 – Generators**

445.1 Scope (NEC 2008)

This article covers the installation of generators.

445.1 Scope (NEC 2011)

This article contains installation and other requirements for generators.

445.12 Overcurrent Protection (NEC 2008)

(A) Constant-Voltage Generators

Constant-voltage generators, except ac generator exciters, will be protected from overloads by inherent design, circuit breakers, fuses, or other acceptable overcurrent protective means suitable for the conditions of use.

445.12 Overcurrent Protection (NEC 2011)

(A) Constant-Voltage Generators
Constant-voltage generators, except ac generator exciters, will be protected from overload by inherent design, circuit breakers, fuses, protective relays, or other identified overcurrent protective means suitable for the conditions of use.

445.19 Generators Supplying Multiple Loads (NEC 2008)

(2) Individual enclosures with overcurrent protection tapped from a single feeder for load separation and distribution.

445.19 Generators Supplying Multiple Loads (NEC 2011)

(2) Individual enclosures with overcurrent protection tapped from a single feeder for load separation and distribution.

ARTICLE – 450 Transformers and Transformer Vaults (Including Secondary Ties)

I. General Provisions

450.3 Overcurrent Protection (NEC 2008)

(B) Transformers 600 Volts, Nominal, or Less

Exception: Where the transformer is installed as a motor control circuit transformer according to section 430.72(C)(1) through (C)(5).

450.14 Disconnecting Means (NEC 2008)

Not listed in 2008

ARTICLE – 480 Storage Batteries

480.2 Definitions

Battery System

Not listed in 2008

Nominal Battery Voltage
The voltage calculated on the basis of 2 volts per cell for the lead-acid type and 1.2 volts per cell for the alkali type.

**Sealed Cell or Battery**

A sealed cell or battery is one that has no provision for the addition of water or electrolyte or for external measurement of electrolyte specific gravity. The individual cells shall be allowed to contain a venting arrangement as described in section 480.10(B).

480.5 Disconnecting Means (NEC 2008)

A disconnecting means will be provided for all ungrounded conductors derived from a stationary battery system over 30 volts. A disconnecting means will be readily accessible and located within sight of the battery system.

Further Information: Not listed in 2008

480.6 Insulation of Batteries Not Over 250 Volts

(A) Vented Lead-Acid Batteries

Cells and multi-compartment batteries with covers sealed to containers on nonconductive, heat-resistant material will not require additional insulation support.

Article – 490 Equipment, over 600 Volts, Nominal

II. Equipment – Specific Provisions

490.21 Circuit – Interrupting Devices

(A) Circuit Breakers

(1) Location

(b) Circuit breakers used to control oil-filled transformers will either be located outside the transformer vault or be capable of operation from outside the vault.

(2) Operating Characteristics
(1) An accessible mechanical or other approved means for manual tripping, independent of control power.

490.22 Isolating Means

Means will be provided to completely isolate an item of equipment. The use of isolating switches will not be required where there are other ways of de-energizing the equipment for inspection and repairs, such as draw-out-type metal-enclosed switchgear units and removable truck panels. Isolation switches not interlocked with an approved circuit-interrupting device will be provided with a sign warning against opening them under load.

A fuseholder and fuse, designed for the purpose, will be allowed as an isolation switch.

III. Equipment – Metal-Enclosed Power Switchgear and Industrial Control Assemblies

490.33 Guarding of Energized Parts Operating at 600 Volts, Nominal, or Less Within Compartments (NEC 2008)

Energized bare parts mounted on doors will be guarded where the door must be opened for maintenance of equipment or removal of draw-out equipment.

490.35 Accessibility of Energized Parts

(B) Control Equipment

Low-voltage control equipment, relays, motors, and the like will not be installed in compartments with exposed high-voltage energized parts or high-voltage wiring unless either of the following conditions are met:

490.40 Visual Inspection Windows

Windows intended for inspection of disconnecting switches or other devices will be of suitable transparent material.

490.41 Location of Industrial Control Equipment
(A) Control and Instrument Transfer Switch Handles or Push Buttons

Control and instrument transfer switch handles or pushbuttons other than those covered in section 490.41(B) will be in a readily accessible location at an elevation of not over 78 in.

(B) Infrequently Operated Devices

Operating handles for infrequently operated devices, such as drawout fuses, fused potential or control transformers and their primary disconnects, and bus transfer switches, will be allowed to be located where they are safely operable and serviceable from a portable platform

490.74 Bonding

All exposed non-current-carrying metal parts of the boiler and associated exposed metal structures or equipment will be bonded to the pressure vessel or to the neutral conductor to which the vessel is connected according to section 250.102, except the ampacity of the bonding jumper will not be less than the ampacity of the neutral conductor.