National Electrical Code Changes for 2008

Developed and Presented by:

The Codes and Standards Group

of

Schneider Electric

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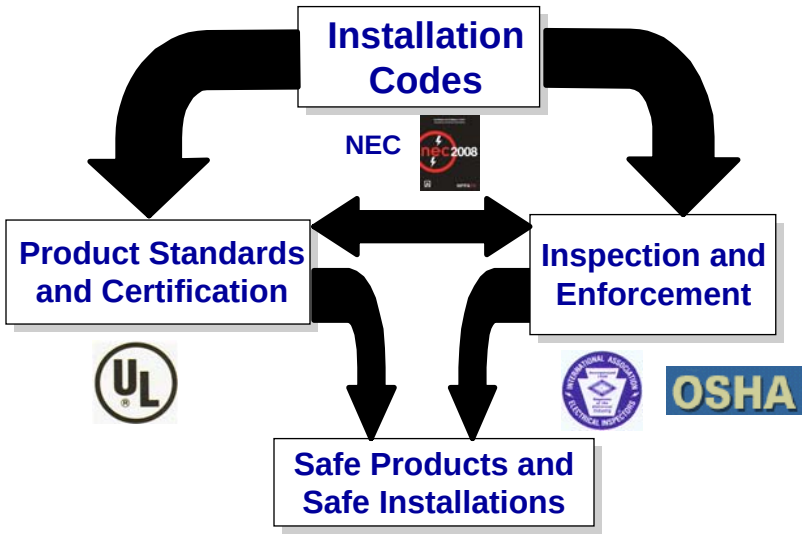
The US Electrical Safety System



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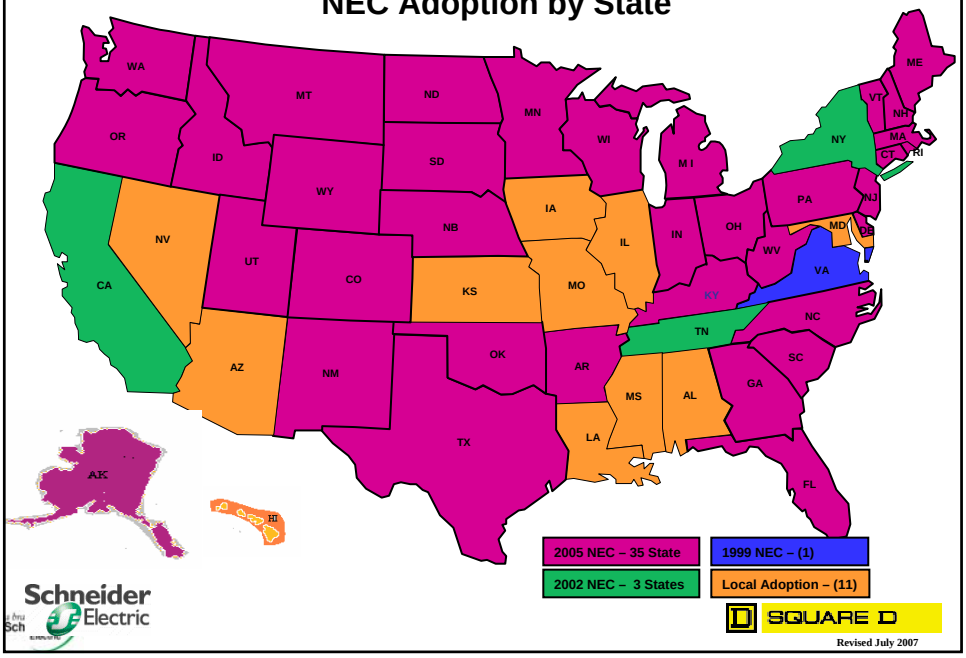
2008 NEC Process

- Approximately 3700 proposals to revise the 2005 NEC
- 20 Code Making Panels met, reviewed and voted on the proposals
  - ROP (Report on Proposals) currently published and out for public comment
- Public comments were due by October 20th
- Code Making Panels met in December to review public comments
- ROC Voting Closed - Feb. 1, 2007
- NFPA Annual Meeting - June 2007
- NEC issued by the NFPA Standards Council - July 2007
- Publication of 2008 NEC mid September 2007

NEC Adoption by State



Revised July 2007

90.3

Code Arrangement

- Chapter 1 - General
- Chapter 2 - Wiring and Protection
- Chapter 3 - Wiring Methods and Materials
- Chapter 4 - Equipment for General Use

} Applies generally to all electrical installations

Supplements or modifies Chapters 1 through 4 {

- Chapter 5 - Special Occupancies
- Chapter 6 - Special Equipment
- Chapter 7 - Special Conditions

- Chapter 8 - Communications Systems

} Chapter 8 is not subject to the requirements of Chapters 1 through 7 except as specifically referenced in Chapter 8

- Chapter 9 - Tables

} Applicable as referenced

- Annex A through Annex G

} Information only not mandatory

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110.20 – Enclosure Types

- Moves enclosure selection table from 430.91 to Article 110
- Applies to 600V and less enclosures for:
  - Switchboards
  - Panelboards
  - MCCs
  - Industrial Control Panels
  - Meter Sockets
  - Motor controllers

Provides a Degree of Protection Against the Following Environmental Conditions	For Outdoor Use									
	Enclosure Type Number									
	3	3R	3S	3X	3RX	3SX	4	4X	6	6P
Falling dirt	X	X	X	X	X	X	X	X	X	X
Falling liquids and light splashing	—	X	X	X	X	X	X	X	X	X
Circulating dust, lint, fibers, and flyings	—	—	X	X	—	X	X	X	X	X
Settling airborne dust, lint, fibers, and flyings	—	—	X	X	X	X	X	X	X	X
Hosedown and splashing water	—	—	X	X	—	X	X	—	—	—
Oil and coolant seepage	—	—	—	—	—	—	—	X	X	X
Oil or coolant spraying and splashing	—	—	—	—	—	—	—	—	—	X
Corrosive agents	—	—	—	X	—	—	X	—	—	—
Temporary submersion	—	—	—	—	—	X	X	—	—	—
Prolonged submersion	—	—	—	—	—	—	X	—	—	—

[1]Mechanism shall be operable when ice covered.

FPN: The term *raintight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 6, 6P. The term *rainproof* is typically used in conjunction with Enclosure Type 3R, 3RX. The term watertight is typically used in conjunction with Enclosure Types 4, 4X, 6, 6P. The term *dusttight* is typically used in conjunction with Enclosure Types 2, 5, 12, 12K, 13. The term *dusttight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 5, 12, 12K, 13.

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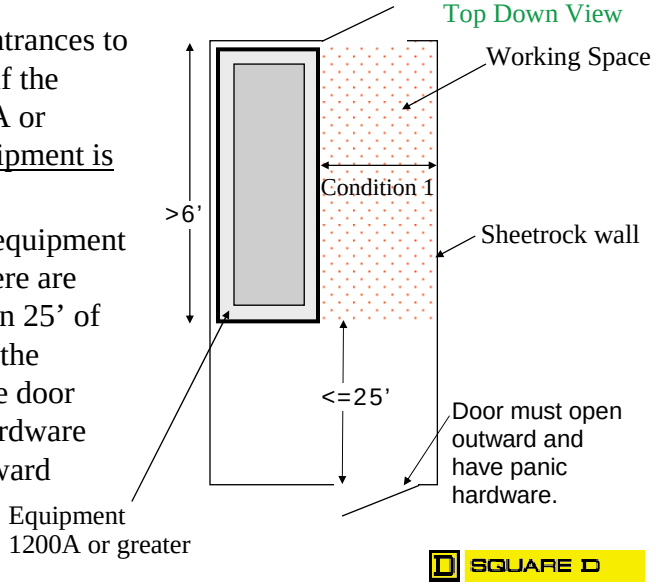
110.26(C) – Entrance to Working Space

(2) – Large Equipment, (3) – Personnel Doors

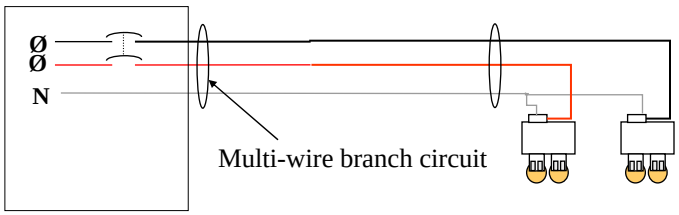
- (2) Requires two entrances to the working space if the equipment is 1200A or greater and the equipment is over 6 feet wide
- (3) Where there is equipment over 1200A and there are doors that are within 25' of the nearest edge of the working space – the door must have panic hardware and must open outward



210.4 – Multiwire Branch Circuits

(B) – Disconnecting Means, (D) - Grouping

- Requirement for simultaneous disconnect of all circuits
  - Not just on same yoke – now includes others circuits such as lighting
- The conductors must now be grouped at one point in the panel (wire tie)
  - Not required if conductors are from cable or raceway unique to the circuit



210.5(C) – Identification for Branch Circuits

Ungrounded Conductors

- Must identify the ungrounded conductors of a branch circuit where:
  - There is more than one nominal voltage system in the building
  - The conductors are accessible
- Identification includes both phase and system
- ID can be color coding, marking, tagging, tape, etc.
- Means of ID shall be documented in a manner that is readily available or shall be posted at each panelboard or similar distribution equipment.

210.8(A) – GFCI (Dwelling Units)

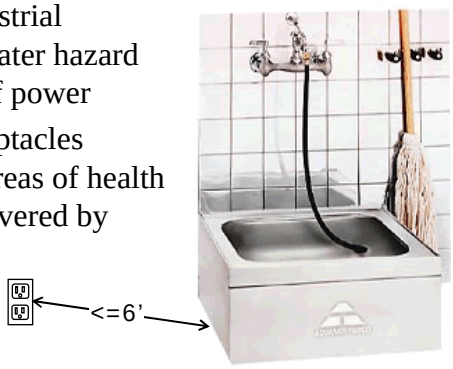
(2) – Garages, (5) – Unfinished Basements

- Deletes the exceptions to (A)(2) and (A)(5) that allow non-GFCI protected receptacles for dedicated appliances and receptacles that are not readily accessible.
- GFCI protection will now be required for all receptacles in the garage and unfinished basements
  - Exception for fire alarm is still in place

210.8(B) – GFCI (Other than Dwelling)

(5) - Sinks

- GFCI protection expanded to all 125V, 15 and 20A receptacles installed within 6’ of any sink
- Exception exempts industrial laboratories where a greater hazard may occur due to loss of power
- Exception exempts receptacles located in patient care areas of health care facilities (unless covered by 210.8(B)(1).



210.8(B) – GFCI (Other than Dwelling)

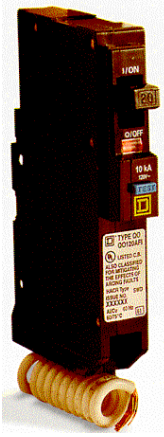
(4) Outdoors

- GFCI expanded to <u>all 125V, 15 and 20A receptacles installed outdoors</u> regardless of the occupancy or location
- Exception for industrial locations when they use the assured equipment grounding conductor program.

210.12 - AFCI

(B) – Dwelling Units

- 120V, 15A and 20A branch circuits that supply outlets in dwelling unit:
  - Family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways or similar rooms
- Requires a listed, combination-type AFCI



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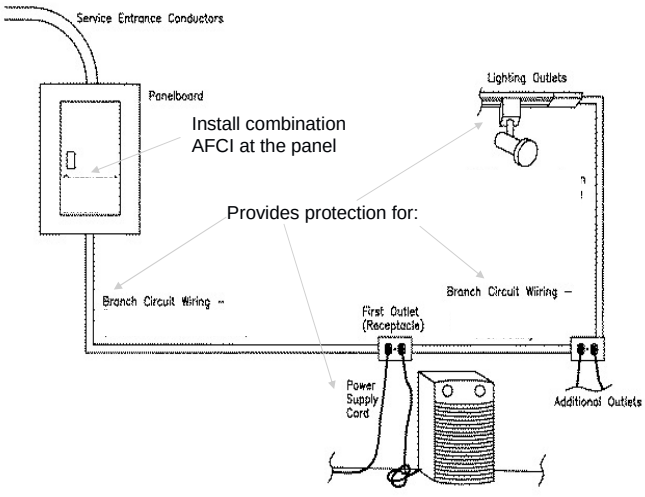
Combination AFCI at the Panel



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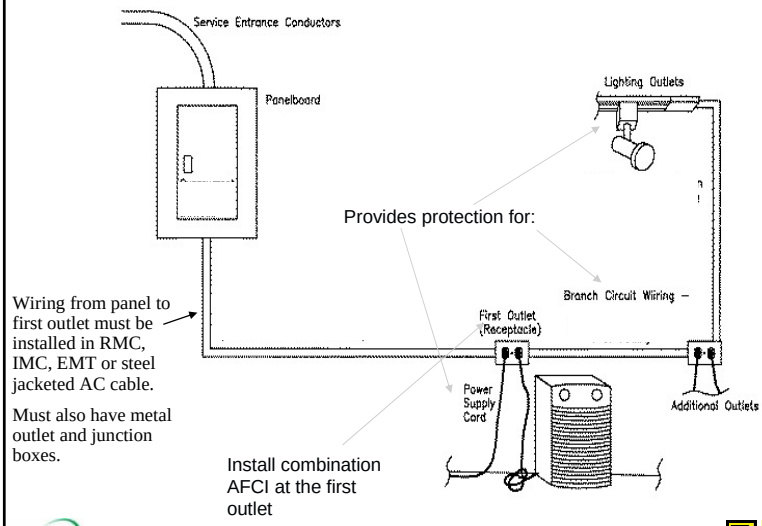


Wiring from panel to first outlet must be installed in RMC, IMC, EMT or steel jacketed AC cable.

Must also have metal outlet and junction boxes.

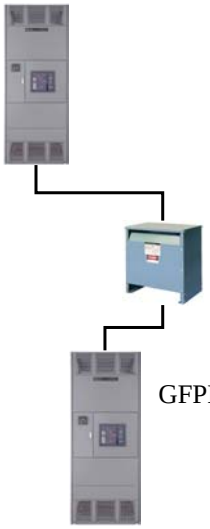
Install combination AFCI at the first outlet

210.52(E) – Dwelling Receptacle Outlets

- Expanded to require an outdoor outlet be installed on all balconies, decks and/or porches.
- Receptacle required for each unit of a multifamily dwelling
- 2005 NEC only required for grade level unit

215.10 – Ground Fault Protection of Equipment

- Requires GFPE on any feeder disconnect:
  - Rated 1000A or more
  - On wye systems with more than 150V to ground and not more than 600V phase to phase
- Exception restated to make it clear that GFPE is not required where:
  - GFPE is on the supply side of the feeder AND <u>on the load side of any transformer supplying the feeder.</u>

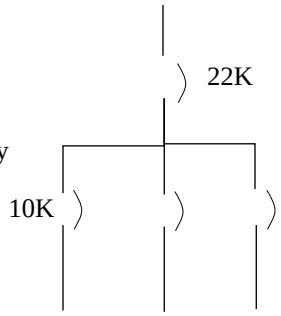


GFPE Required

240.86(A) – Series Ratings

Selected Under Engineering Supervision in Existing Installations

- Allows a series rating to be "engineered" under the following conditions:
  - By a licensed professional engineer engaged primarily in the design or maintenance of electrical installations
  - Selection shall be documented and stamped by the professional engineer
  - Documentation shall be made available
  - Rating shall be field marked on the end use equipment
  - Existing installations only
  - <u>Engineer shall ensure that the downstream breakers that are part of the series combination remain passive during interruption period of the line side device.</u>



240.92 – Location in Circuit

(B) – Feeder Taps

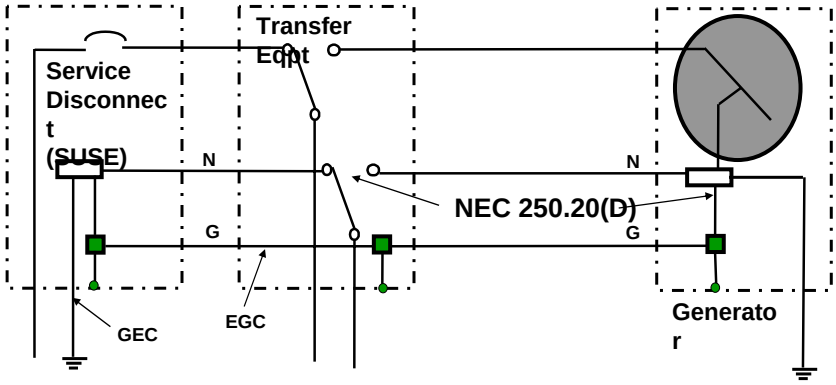
- Adds a new provisions to the “Supervised Industrial Installation” rules
- Allows conductor size to be based on ICEA formulas

$$(\frac{I^2}{A^2})t = 0.0297 \log_{10}[(T_2 + 234)(T_1 + 234)]$$

I = short circuit current in amperes
A = conductor area in circular mils
t = time of short circuit in seconds
T_1 = initial conductor temperature
T_2 = final conductor temperature

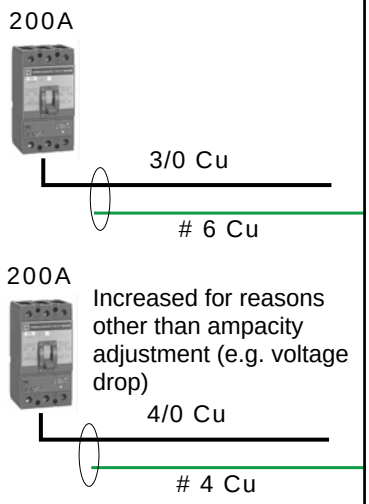
250.20(D) – Separately Derived Systems

Text added to make it clear that a generator installation with transfer equipment that switches the grounded conductor must be grounded in accordance with 250.30(A)



250.122 – Size of Equipment Grounding Conductors

New text clarifies that when ungrounded conductors are increased in size for ampacity adjustment, the equipment grounding conductors do not need to be increased proportionally



Article 280 – Surge Arresters

- Now applies only to arresters over 1kV
- Article 285 now covers all Surge Protective Devices less than 1kV

285 – Surge Protective Devices (SPD)

- UL 1449 - 3rd Edition Released
- UL Proposal to align NEC terminology with UL standard
  - Type 1 - Line side of Service Disconnect
  - Type 2 – Load Side of Service Disconnect
  - Type 3 – Outlet device / Plug strips
  - Type 4 – Recognized Component

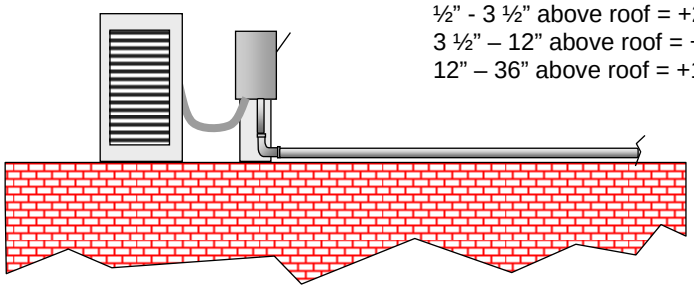



310.15(B)(2) – Adjustment Factors

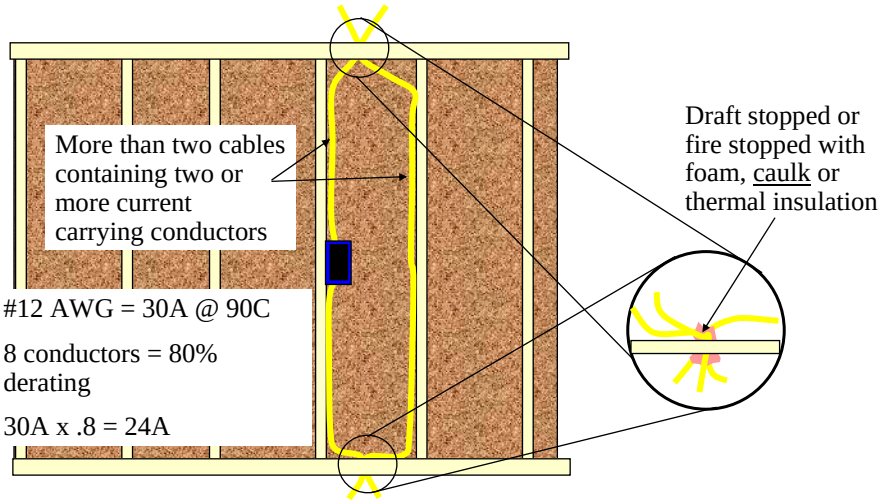
(c) – Conduits Exposed to Sunlight on Rooftops

- Requires that the ambient temperature used for ampacity correction be adjusted by specified factors where:
  - Conductors or cables are installed in conduit
  - The conduit is on or above a rooftop
  - The conduit is exposed to direct sunlight

0 – ½" above roof = +33C
½" - 3 ½" above roof = +22C
3 ½" – 12" above roof = +17C
12" – 36" above roof = +14C

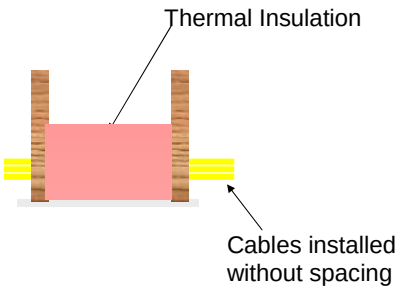


334.80 – NM Sheathed Cable: Type NM, NMC, NMS



334.80 - Ampacity

- Requires ampacity adjustment factors to be applied to NM cable where:
  - More than two cables (with two or more current carrying conductors) are installed without spacing
  - The cables are installed in contact with thermal insulation



406.8(B) – Wet Locations

(1) – 15 and 20A Receptacles in a Wet Location

- Requires a receptacle that is listed as weather-resistant type
- Includes 125V and 250V configurations
- Excludes locking type receptacles

406.11 – Tamper Resistant Receptacles in Dwelling Units

- Requires listed tamper-resistant receptacles for:
  - 125 volt 15 and 20 ampere receptacles
  - Installed in all areas specified in 210.52

408 – Panelboards

- 42 Circuit Restriction being removed
- Product Standard has requirements for Class CTL panels that will need to be addressed
- Product markings will restrict number of circuits until product standard is revised
- 42 Circuit panelboard limitation still resides within NEC Article 645

408 – Panelboards

408.36 Overcurrent Protection. In addition to the requirements 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.

408 – Panelboards – Service Equipment

408.36 Overcurrent Protection.

Exception No. 1: Individual protection shall not be required for a panelboard used as service equipment with multiple disconnecting means in accordance with 230.71. In panelboards protected by three or more main circuit breakers or sets of fuses, the circuit breakers or sets of fuses shall not supply a second bus structure within the same panelboard assembly.

408 – Panelboards – Retains 42 Circuit Panel Protection Rule

408.36 Overcurrent Protection.

Exception No. 2: Individual protection shall not be required for a panelboard protected on its supply side by two main circuit breakers or two sets of fuses having a combined rating not greater than that of the panelboard. A panelboard constructed or wired under this exception shall not contain more than 42 overcurrent devices. For the purposes of determining the maximum of 42 overcurrent devices, a 2-pole or a 3- pole circuit breaker shall be considered as two or three overcurrent devices, respectively.

408 – Panelboards – Existing Split-bus Protection Rule

408.36 Overcurrent Protection.

Exception No. 3. For existing panelboards, individual protection shall not be required for a panelboard used as service equipment for an individual residential occupancy.

409.110(3) - Marking

- New exception that allows SCCR marking to be omitted on control panels containing on control circuit components

430.126 – Overtemperature Protection

(A) General. Adjustable Speed drive systems shall protect against motor overtemperature conditions where the motor is not rated to operate at the nameplate rated current over the speed range required by the application.

(1) Motor thermal protector meeting 430.32

(2) Adjustable speed drive system with load and speed sensitive overload protection

(3) Overtemperature protection relay utilizing thermal sensors embedded in the motor

(4) Thermal sensors embedded in the motor that communicates with the drive

Article 519 – Control Systems for Permanent Amusement Attractions

- This article covers the installation of control circuit power sources and conductors for electrical equipment, including associated control wiring in or on all structures, that are an integral part of a permanent amusement attraction.

590.6 – Temporary Installations - GFCI

New text makes it clear that the GFCI provisions apply whether power is derived from a utility source or an on-site generator

Article 626 – Electrified Truck Parking Space Equipment

The provisions of this article cover the electrical conductors and equipment external to the truck or transport refrigerated unit that connect trucks and transport refrigerated units to a supply of electricity, and the installation of equipment and devices related to electrical installations within an electrified truck parking space.

NEC 645.17 – Information Technology Equipment

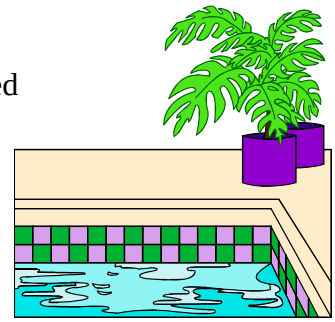
Power Distribution Units

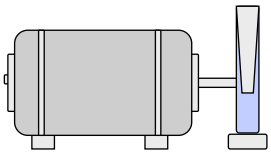
- Introduced in the 2005 NEC
- Used for information technology equipment
- May have multiple panelboards within a single cabinet
- Each panelboard limited to 42 overcurrent devices
- Utilization equipment listed for information technology application

NEC 680.22(B) – Pool Motors

GFCI Protection

- Wiring supplying pool pump motors rated 15 and 20 amperes, 125 or 240 volts shall be provided with GFCI protection.
- Required whether hard wired or cord and plug connected





700.6(C) – Automatic Transfer Switches

- Automatic transfer switches, rated 600 VAC and below, shall be Listed for emergency system use.

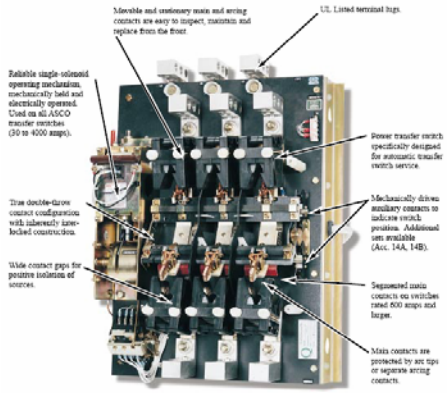


Fig. 2 ASCO 940 power transfer switch rated 3 pole, 800 amps with pole covers and arc barriers removed.


Fig. 2 Automatic Transfer Switch rated 3 pole 400 amperes.

700.9(B) – Distribution (New)

(B) Distribution. Wiring from an emergency source that supplies a vertical switchboard or individual disconnects with overcurrent protection grouped at one location shall be permitted to serve a combination of emergency, legally required and optional standby systems in accordance with (1) through (3).

(1) Switchboards or individual enclosures shall be permitted to be supplied by a single feeder.

(2) Legally required and optional standby circuits shall not originate from vertical sections or enclosures that supply emergency circuits.

(3) Separate switchboard sections shall be provided for each emergency, legally required, or optional standby system.

700.9(C)(5) – Wiring

(5) Wiring from an emergency source shall be permitted to supply any combination of emergency, legally required, or optional loads in accordance with (a), (b) and (c).

(a) From separate vertical switchboard sections, with or without a common bus, with or without a common bus, or from individual disconnects mounted in separate enclosures.

(b) The common bus or separate sections of the switchboard or the individual enclosures shall be permitted to be supplied by single or multiple feeders without overcurrent protection at the source.

(c) Legally required and optional standby circuits shall not originate from the same vertical switchboard section, panelboard enclosure or individual disconnect enclosure as emergency circuits.

Exception to (5) (b). Overcurrent protection shall be permitted at the source or for the equipment, provided the overcurrent protection is selectively coordinated with the down stream overcurrent protection.

700.27 – Emergency Systems

Overcurrent Protection

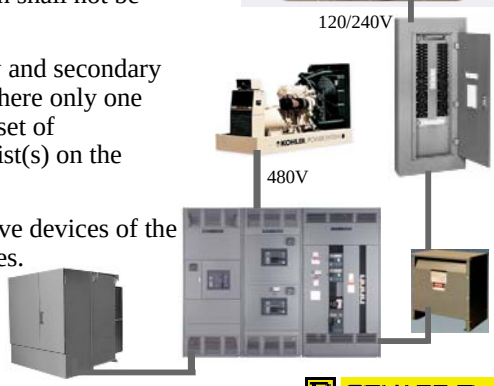
Selective Coordination

Emergency system(s) overcurrent devices shall be selectively coordinated with all supply side overcurrent protective devices.

Exception: Selective coordination shall not be required in (1) or (2):

(1) Between transformer primary and secondary overcurrent protectivedevices, where only one overcurrent protective device or set of overcurrentprotective devices exist(s) on the transformer secondary,

(2) Between overcurrent protective devices of the same size (ampere rating) in series.



702.5(2) – Automatic Transfer Equipment

- If an automatic transfer is used in an optional system, the system must either:
  - The source (generator) must be able to pick up the full load transferred by the equipment
  - A load management system must be installed that will limit the load to that capable of being supplied by the source

708 – Critical Operations Power Systems

- In Response to Homeland Security Activity
- Steps beyond an Emergency System
- How do we keep a system in operation for days?

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- The Codes and Standards group can offer on-site custom training on the NEC and related topics
- Our staff has extensive involvement in codes and standards development, interpretation and application

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