2017 NATIONAL ELECTRICAL CODE

Significant Changes

Be mindful of which code governs…

<u>International Residential Code (IRC)</u>

-- One and two family, townhomes

<u>National Electric Code (NEC)</u>

-- Everything else!

DON’T FORGET – Local amendments.

Code Layout

Revised to create an easy to understand NEC "roadmap"

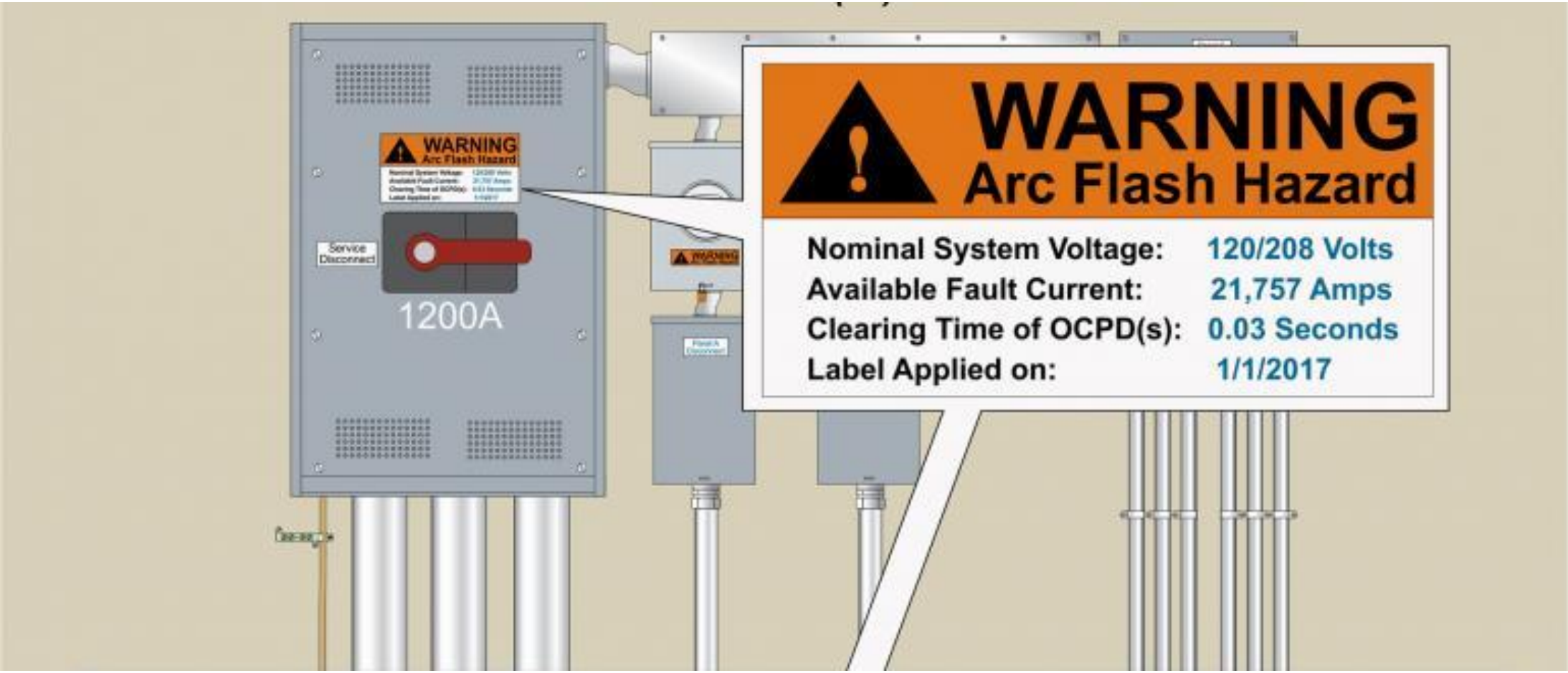
- Chapters 1,2,3&4 apply generally
- Chapters 5,6,&7 apply to **special occupancies**, equipment or conditions
- Chapter 8 applies to **communication systems** not subject to Chapters 1-7
- Chapter 9 is **reference tables**
- Annexes are informational only, not mandatory

SPOT THE VIOLATION?

ENERGYGUIDE
13.00
7.70

110.16 (B) Arc Flash Hazard Warning

- Non-dwelling unit service equipment rated at 1,200 amps or more is required to be labeled with an arc flash and shock hazard label containing the **normal system voltage**, available **fault current**, **clearing times** and the **date** the label was applied.


WARNING
Arc Flash Hazard
Service Disconnect
1200A
WARNING
Arc Flash Hazard
Nominal System Voltage: 120/208 Volts
Available Fault Current: 21,757 Amps
Clearing Time of OCPD(s): 0.03 Seconds
Label Applied on: 1/1/2017

GFCI's

- When were GFCI's first required?
  - 1971

- Where were they first required?
  - Originally they were only required at the exterior of the house and by swimming pool equipment.

Changes to GFCI Requirements

- 210.8(B) **Ground fault circuit interrupter protection for personnel.** Adds 3 phase receptacles to requirement for GFCI protection in other than dwelling units.
- 210.8(B)(9) **Ground fault circuit interrupter protection for personnel.** GFCI protection for receptacles in non-dwelling unit crawl spaces has been added.

Changes to GFCI Requirements

- 210.8(B)(10) **Ground fault circuit interrupter protection for personnel.** GFCI protection has been added for receptacles in non-dwelling unit unfinished basements.
- 210.8(E) **Ground fault circuit interrupter protection for personnel.** GFCI protection for lighting outlets in crawl spaces has been added.

New Informational Note No.2:

For the purposes of this section, when determining distance from receptacles, the distance shall be measured as the shortest path the cord of an appliance connected to the receptacle would follow, **without piercing a floor, wall, ceiling, for fixed barrier, or passing through a door, doorway or window.**

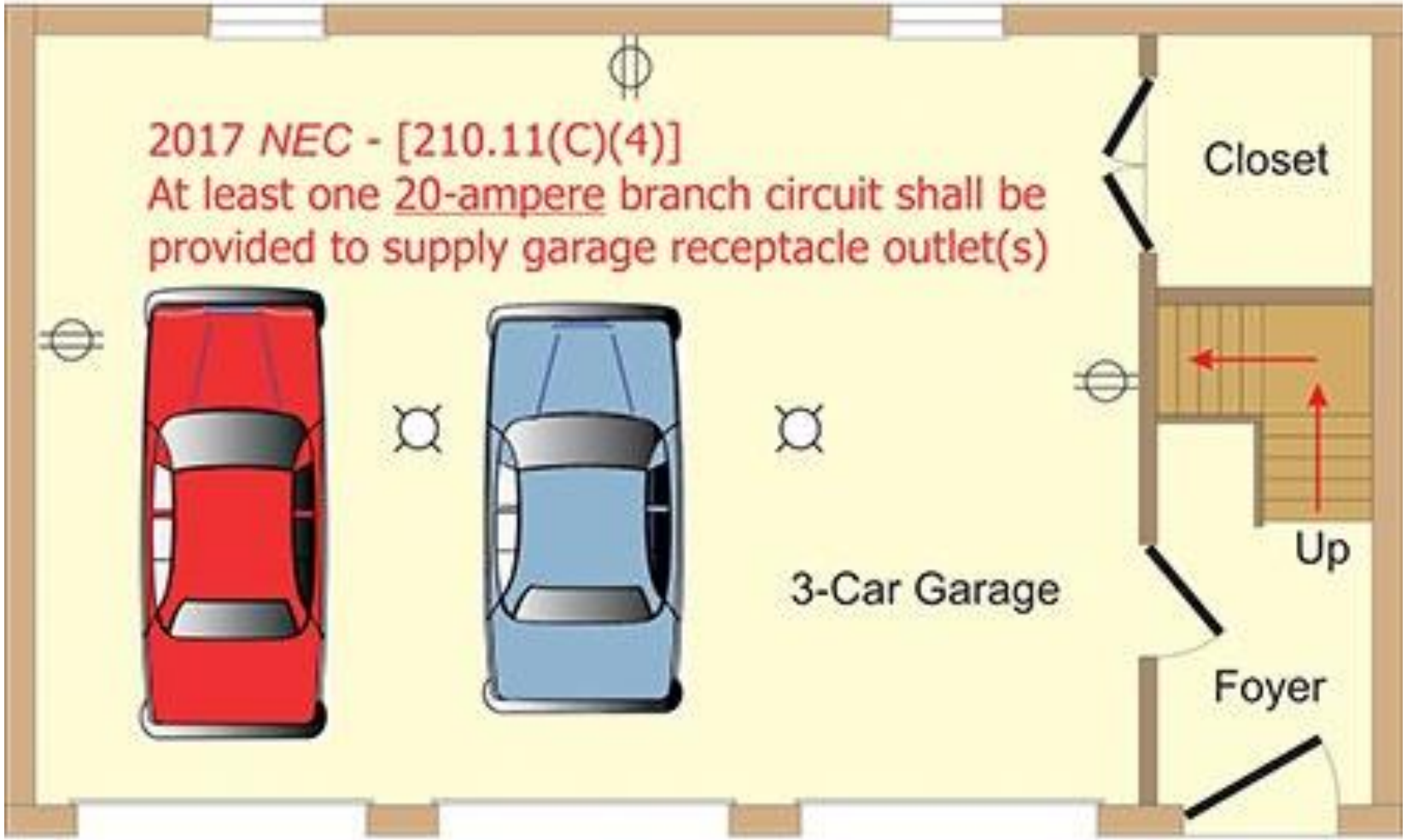
SPOT THE VIOLATION?

ON
OFF

Garage Branch Circuits

- 210.11(C)(4) **Garage branch circuits.** Now requires the dedicated garage circuit to be 20 amp. That circuit may now also serve outdoor receptacle outlets.

210.11(C)(4) Dwelling Unit Garages



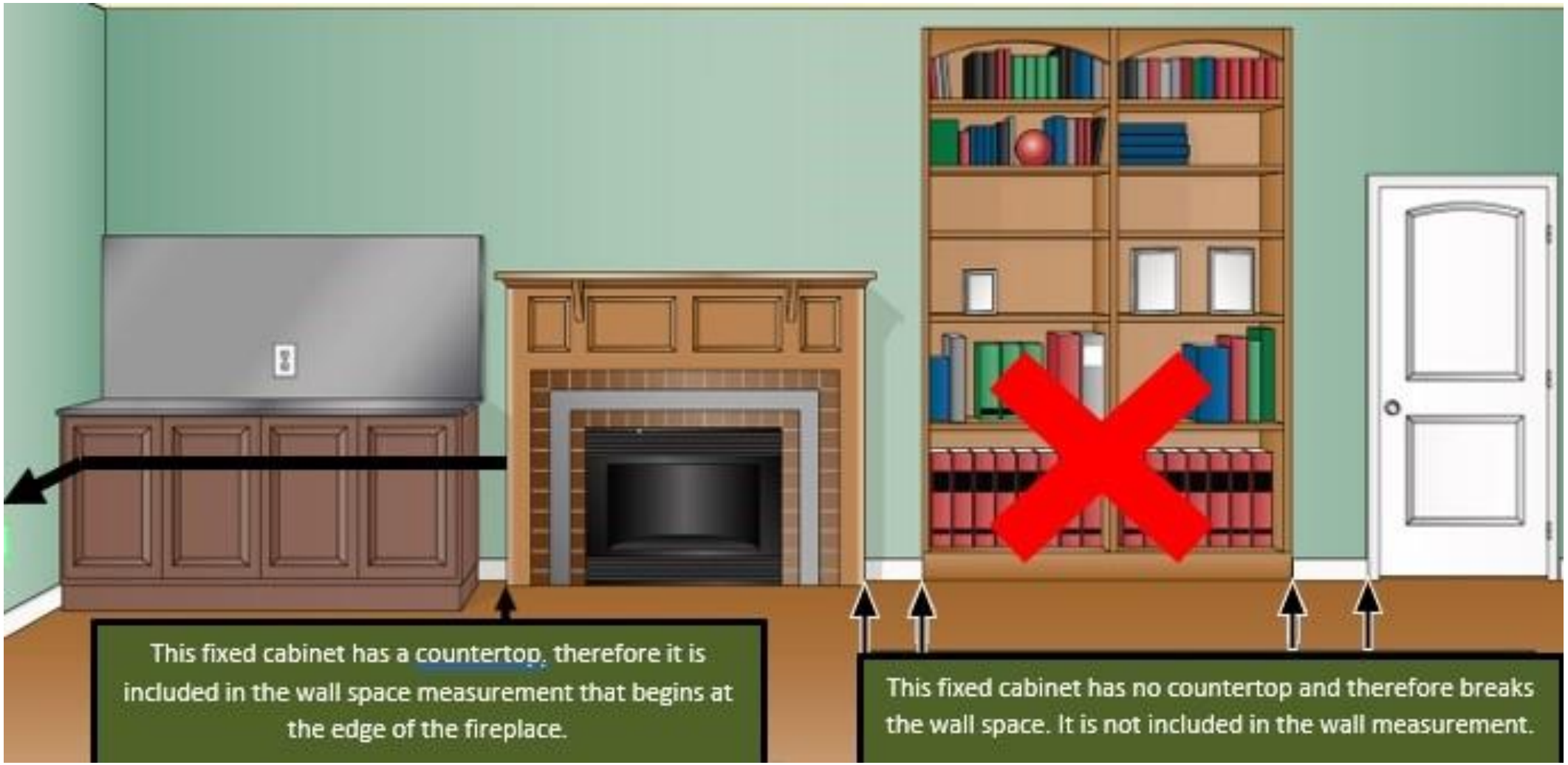
Arc Fault Protection

- 210.12(C) **Arc-Fault Circuit-Interrupter protection.** New provisions added requiring arc fault protection in guest rooms/suites of hotels/motels.

- NOTE: local amendment (still bedrooms only….)

Dwelling Unit Receptacle Outlets

- 210.52(A)(2)(1) **Dwelling unit receptacle outlets.** Fixed cabinets that do not have countertops or similar work spaces was added as an item that will constitute a break in a wall space for receptacle spacing requirements at dwelling units.


This fixed cabinet has a countertop, therefore it is included in the wall space measurement that begins at the edge of the fireplace.
This fixed cabinet has no countertop and therefore breaks the wall space. It is not included in the wall measurement.

Dwelling Unit Receptacle Outlets

- 210.52(A)(2)(1) **Dwelling unit receptacle outlets.** Fixed cabinets that do not have countertops or similar work spaces was added as an item that will constitute a break in a wall space for receptacle spacing requirements at dwelling units.
- 210.52(B)(1) **Dwelling unit receptacle outlets.** An individual branch circuit supplying a receptacle outlet for any specific appliance (not just the refrigerator) at a dwelling unit is allowed to be rated at 15 amp or greater.
- 210.52(C)(3) **Dwelling unit receptacle outlets.** The measurement point for peninsular countertops has been changed from the connecting edge to the connected perpendicular wall.

1
2017 NEC
From the wall
2
2014 NEC
From the edge
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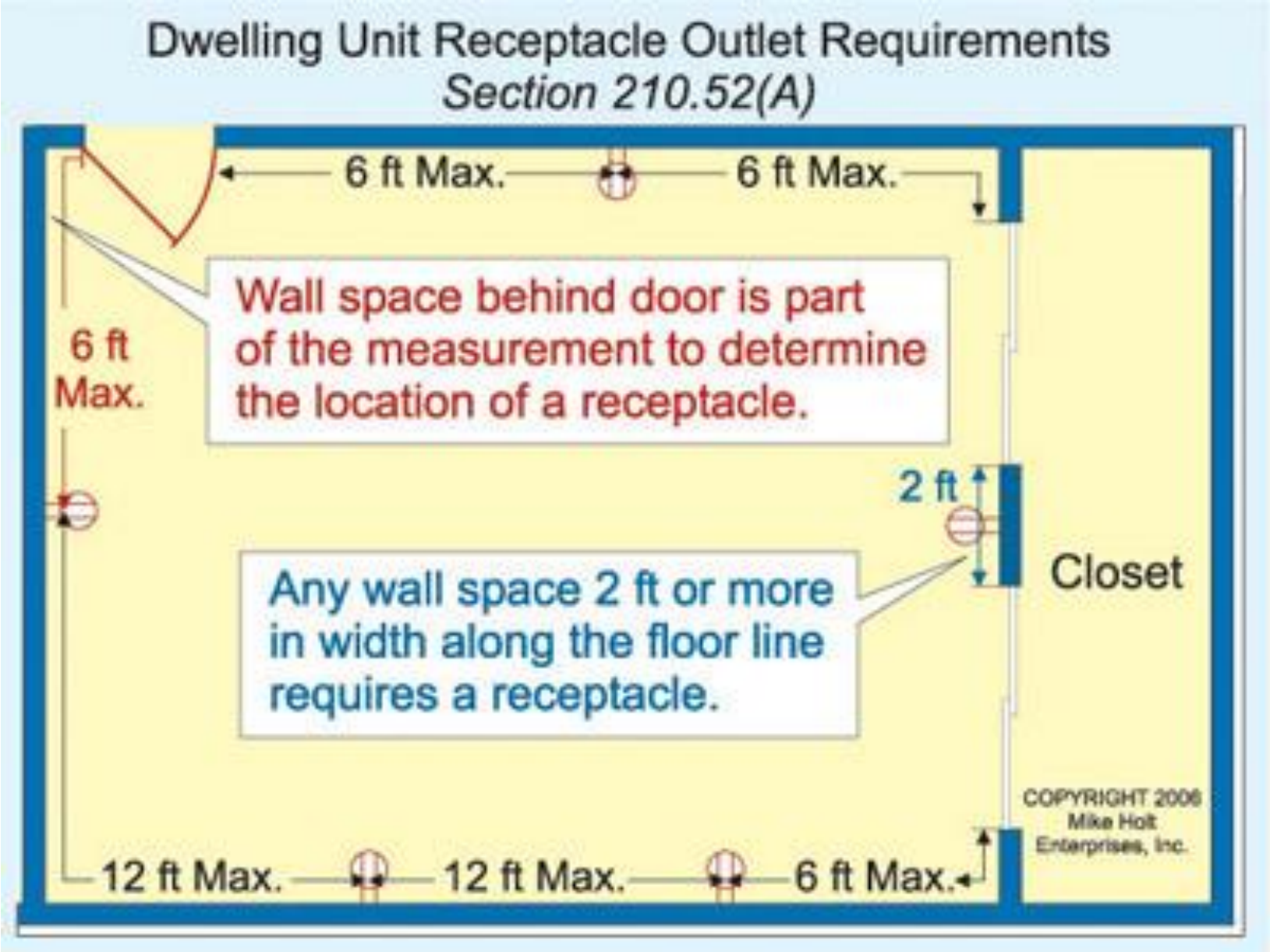
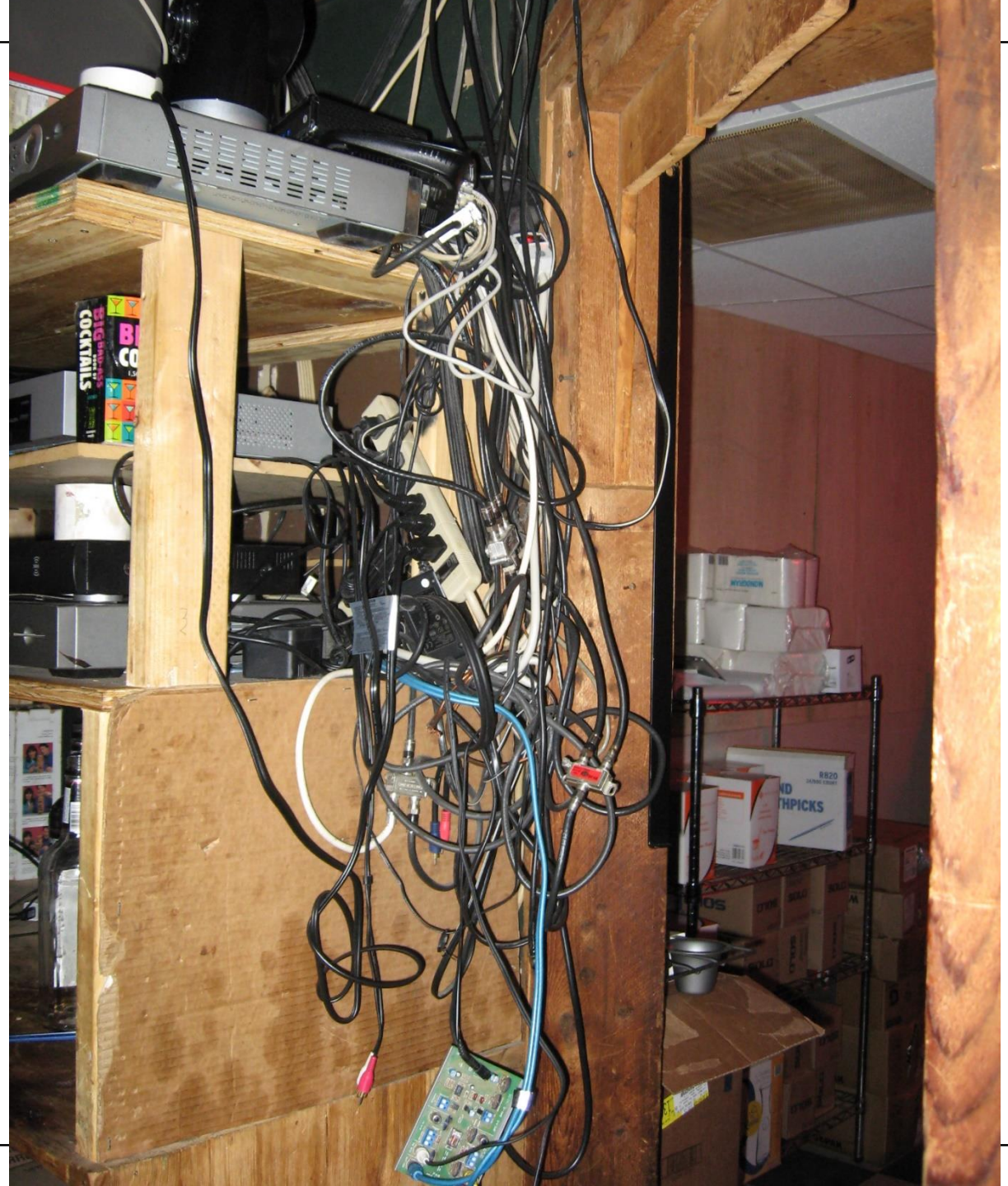
Dwelling Unit Receptacle Outlets

- 210.52(G)(1) **Dwelling unit receptacle outlets.** The one required receptacle outlet for each garage vehicle bay must be in the bay for that vehicle and cannot be more than 5 ½ feet above the floor.


Dwelling Unit Receptacle Outlet Requirements
Section 210.52(A)
6 ft Max.
6 ft Max.
Wall space behind door is part of the measurement to determine the location of a receptacle.
6 ft Max.
2 ft
Closet
Any wall space 2 ft or more in width along the floor line requires a receptacle.
COPYRIGHT 2006 Mike Holt Enterprises, Inc.
12 ft Max.
12 ft Max.
6 ft Max.

SPOT THE VIOLATION?


COCKTAILS
THPICKS

Grounding and bonding

- What is "grounding"? 250.4(A)(1) – "…connected to earth in a manner that will limit the voltage imposed by lightning, line surges or unintentional contact with higher voltage lines…"

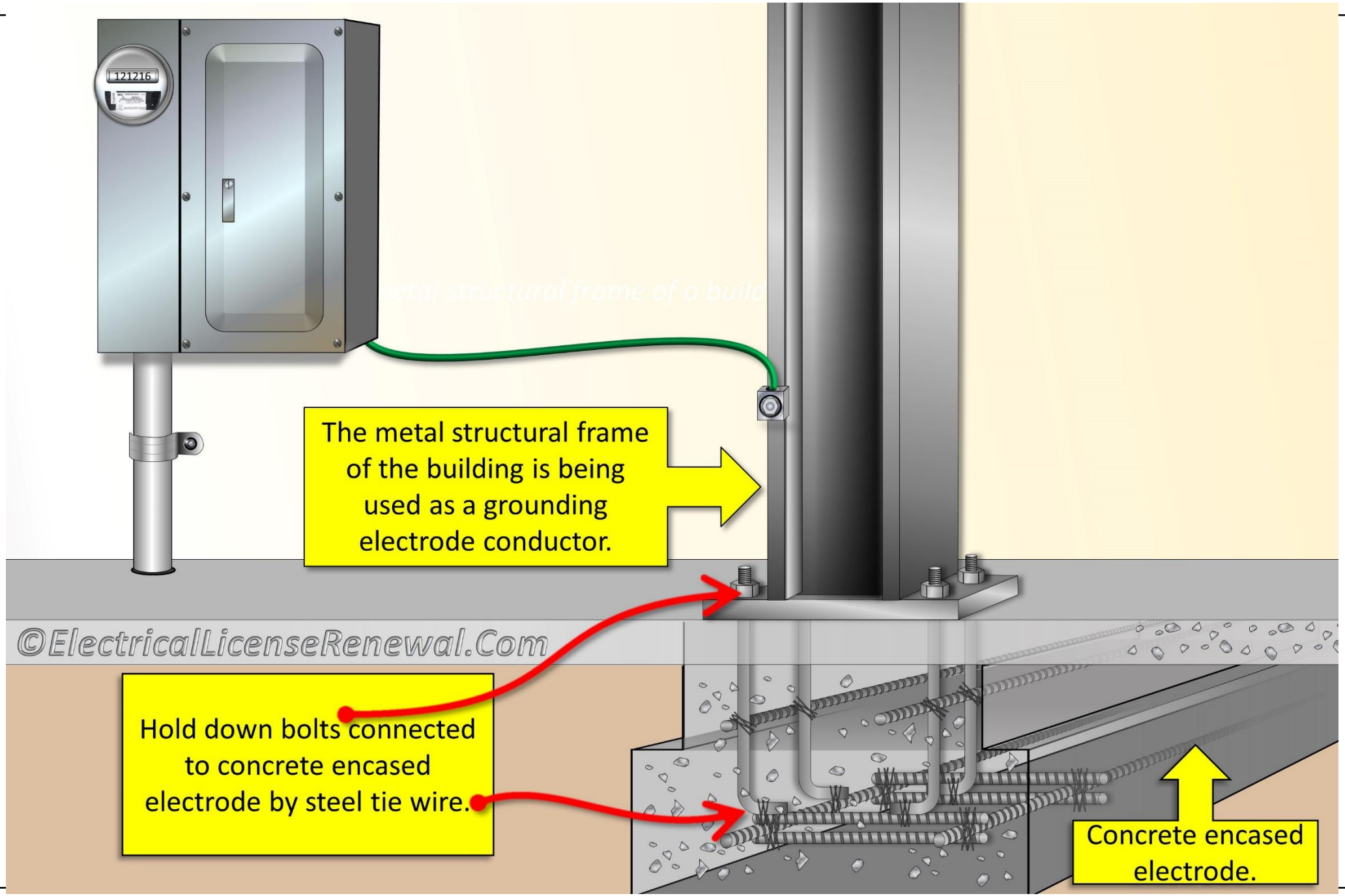
  - Grounding electrode & Grounding electrode conductor"

What is bonding? 250.4(A)(3) – "Normally non-current carrying conductive materials enclosing electrical conductors or equipment, or forming part of such equipment, shall be connected together **and to the electrical supply source** in a manner that establishes an effective ground fault current path"

  - "Equipment Grounding Conductor"

Grounding and bonding

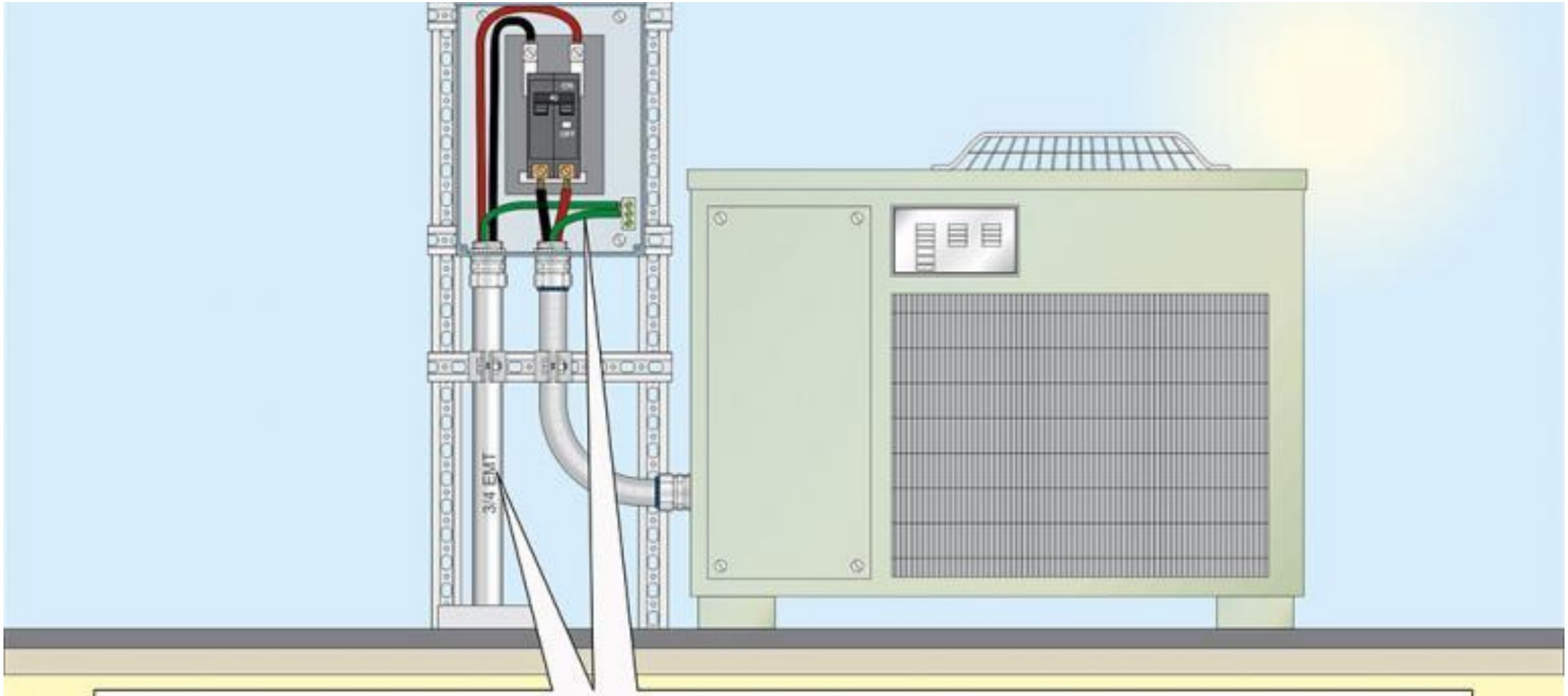
- 250.52(A)(2) **Grounding electrodes.** Revised the conditions for using a metal building frame as a grounding electrode to a frame that is in contact with the earth for a depth of at least 10’ with or without concrete encasement or a frame bolted to a concrete encased electrode.


121216
The metal structural frame of the building is being used as a grounding electrode conductor.
©ElectricalLicenseRenewal.Com
Hold down bolts connected to concrete encased electrode by steel tie wire.
Concrete encased electrode.

Grounding and bonding

- 250.52(A)(2) **Grounding electrodes.** Revised the conditions for using a metal building frame as a grounding electrode to a frame that is in contact with the earth for a depth of at least 10' with or without concrete encasement or a frame bolted to a concrete encased electrode.
- 250.52(B)(3) **Grounding electrodes.** In ground swimming pool structures are prohibited from being used as a grounding electrode. (must still be bonded though)

- 440.9 **Grounding and bonding –rooftop equipment.** New requirement for an equipment grounding conductor to be added for **non-threaded** conduit systems on rooftops supplying **multi-motor or combination-load** HVAC equipment.



Where equipment is installed on a roof, an equipment grounding conductor of the wire type must be installed

Protection of conductors

- 300.5(D)(4) **Protection from physical damage.** Electrical Metallic Tubing (EMT) was added as an acceptable method to afford protection from physical damage underground.
- 310.15(B)(3) **Raceways and cables on rooftops.** Raceways and cables installed on rooftops are now required to be installed at least **7/8" above the rooftop** to avoid a temperature adder of 60 degrees F.
- 314.17(B) **Conductors entering boxes, conduit bodies or fittings.** The outside sheath of Type NM or Type UF cable used with a metal box must now extend not less than **¼" inside the box** as required for non-metallic boxes.

- 344.14 **Dissimilar metals. (Rigid Metal Conduit)** Stainless steel RMC must only be used with stainless steel fittings, approved accessories, outlet boxes and enclosures.
- 350.28 **Trimming. (Liquidtight Flexible Metal Conduit)** All cut ends of LFMC shall be trimmed inside and out to remove rough edges.

- 406.12 **Tamper resistant receptacles.** Requirements for tamper resistant receptacles were expanded to:
  - mobile homes
  - preschools
  - elementary education buildings
  - business and medical offices
  - transportation facilities
  - gymnasiums
  - skating rinks
  - auditoriums
  - dormitories

As always… note the exceptions:

- Over 5.5’ above floor
- Part of a luminaire or appliance
- Dedicated to an appliance, not easily moved
- Non-grounded receptacles used as replacements

- 422.16(B)(2) **Flexible cords. (appliances, dishwashers)** The max length of a flexible cord for built in dishwashers was increased from 4 feet to 6.5 feet while the receptacle outlet for a built in dishwasher (GFCI protected) can only be located in the **space adjacent to the dishwasher.**
- 422.16(B)(4) **Flexible cords. (appliances, range hoods)** The max length of cord for cord and plug type range hoods has been increased from 3 feet to 4 feet.

PV systems

- 690.12 **Rapid shutdown of PV systems on buildings.** Revised section to make clear that the primary purpose of the rapid shutdown is to reduce shock hazard for first responders and to clarify the functionality of the rapid shutdown itself.
- 690.47 **PV grounding electrode system.** Auxiliary electrodes for structure mounted PV arrays are now permitted rather than required.

Fire pumps

- 695.6 **Power wiring (fire pumps).** Revised to indicate that GFCI's are not permitted for fire pump power circuits.
- 695.15 **Surge protection (fire pumps).** A listed surge protection device shall be installed in or on the fire pump controller.

Other NEC Items

- 770.44 **Overhead optical fiber cables.** New requirements for mounting of overhead fiber optic cables including minimum separation from overhead power cables and roofs.
- 770.100(B)(3)(2) **Lightning protection system conductors.** Revised to clarify that lightning protection system conductors (not just air terminal conductors) are not to be used as part of the grounding electrode conductor or as a grounding electrode for fiber optic or communication systems.

QUESTIONS?