



Welcome  
To The 2021  
Significant  
Code Change  
Training Class

600 N Main Street, Suite 107 | Woodstock, Virginia 22664 | 540-459-6185

[ShenandoahCountyVA.us](http://ShenandoahCountyVA.us)

# HOUSEKEEPING

- 1- PLEASE TURN CELL PHONES  
OFF
- 2- BATHROOMS ARE ACROSS  
THE HALL
- 3- THERE ARE TWO FIRE EXITS  
THE DOOR YOU CAME IN AND A  
DOOR DIRECTLY BEHIND ME



# INTRODUCTION

The following codes have been adopted by the state of Virginia with an effective date of January 18<sup>th</sup> 2024.

- 2021 Virginia Residential Code (VRC)
- 2021 Virginia Construction Code (VCC)
- 2021 Virginia Plumbing Code (VPC)
- 2021 Virginia Mechanical Code (VMC)
- 2021 Fuel and Gas Code (FGC)
- 2021 Pool and Spa Code (VPSC)
- 2021 Virginia Statewide Fire Code (VSFC)
- 2020 National Electrical Code (NEC /NFPA 70)
- 2017 A117.1 Accessibility Standard



During this code change cycle there were 728 changes that ranged from definitions, modifications and to complete deletions.

During my training that lasted 1 week we only covered 17% of the changes.

It is my goal to only present the significant changes that will adversely affect you. It is by no means all of the changes that took place.

You may order the 2021 Virginia Codes and the 2020 NEC books by going on line and search for ICC bookstore.



## PLEASE KEEP IN MIND !!

The state of Virginia does allow for a 1(one) year grace period when apply for permits.

When you apply for permits it is your responsibility to inform the permit technicians that you intend to build under the 2018 Virginia building codes.

This exception will expire on January 17, 2025.

Once you have started working on a project you will **not** be able to change back to the previous code cycle (2018).



## Training Schedule

- 1) Accessibility
- 2) Mechanical / Fuel Gas
- 3) Building
- 4) Existing Building
- 5) Plumbing
- 6) Electrical

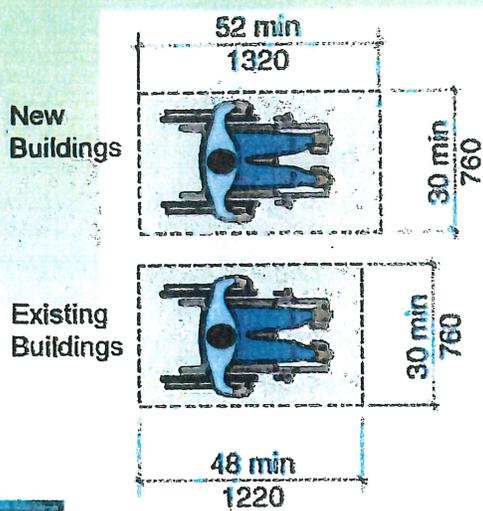
# **Significant Changes to the A117.1 Accessibility Standard 2017 Edition**

**4**

**SIGNIFICANT  
CHANGES**

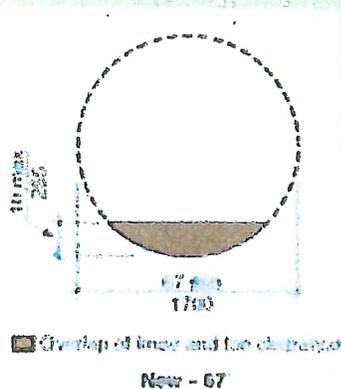
# Significant Changes to the ICC A117.1 - Accessibility Standard - 2017 Edition

## Clear Floor Space 305.3 Size



- Length of space increased to 52" min. for new buildings
- 48" length OK for existing buildings
- This "building block" requirement impacts many provisions
- Exceeds ADA

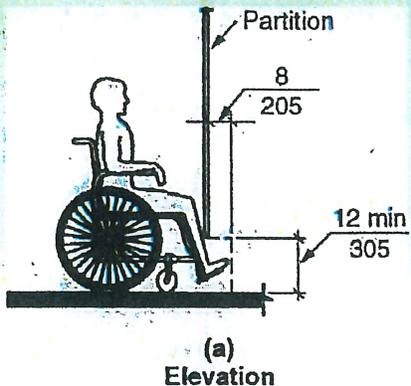
## Turning Space 304.3.1 Circular Space



- Size increased to 67" for new buildings
- Was previously 60"
- Amount of knee and toe clearance allowed for overlap is now limited to 10" max.
- Part of Wheeled Mobility Task Group work

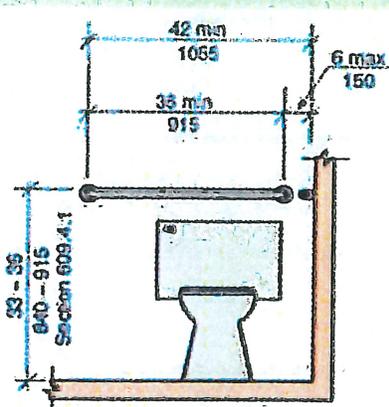
# Significant Changes to the ICC A117.1 - Accessibility Standard - 2017 Edition

## Wheelchair Accessible Compartment 604.9.5.1, 604.9.5.2 Toe Clearance



- Minimum height of adult compartment partitions raised to 12 inches
- Coordinates with the previous requirement for children's use
- Based on mobility report, previous height only accommodated 50% of users

## Grab Bars for Water Closets 604.5.1, 604.5.2

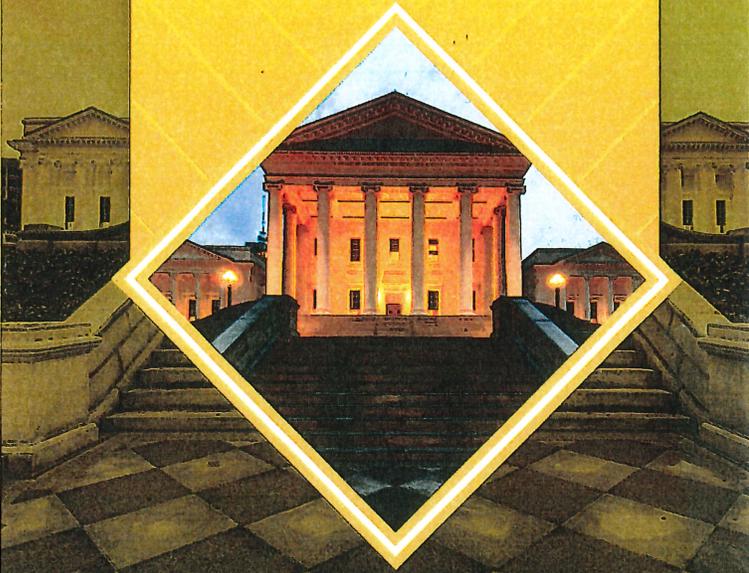


- Reformatted rear wall bar requirements for clarity
- Rear grab bar measured from side wall vs. centerline of W.C.
- May require longer rear bar due to 3 requirements
- May differ from ADA if not set exactly at 6" with W.C. not set exactly at 18"

Any Questions?



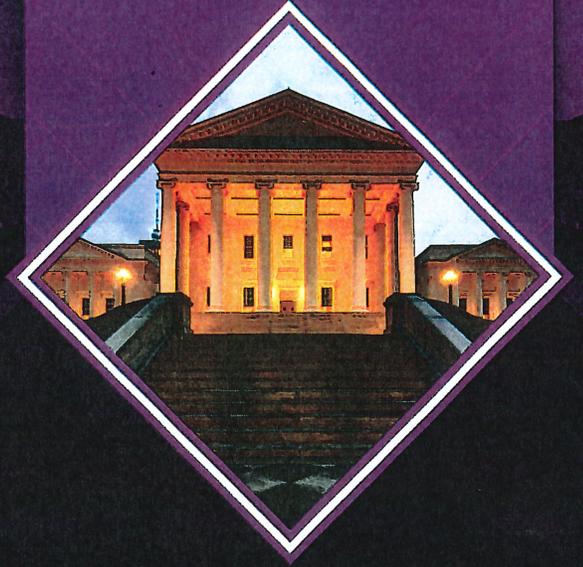
2021



**Virginia  
Fuel Gas Code**



2021



**Virginia  
Mechanical Code**



**12**  
**SIGNIFICANT  
CHANGES**

### G2414.8.3 (403.8.3) Threaded Joint Sealing



**Change Type:** Modification

- Text was revised to require the use of thread joint sealants (aka joint compounds, pipe dope, pipe tape).
- Thread sealants act primarily as a lubricant to allow the threads to form a tight metal-to-metal seal and any imperfections or voids in the threads are filled in by the thread sealant material.
- The most common thread sealants used today are pastes made with PTFE (Teflon) and Teflon tapes.

**G2414.8.3 Threaded joint sealing.** Threaded joints shall be made using a thread joint sealing material. Thread joint sealing materials shall be nonhardening and shall be resistant to the chemical constituents of the gases to be conducted through the piping. Thread joint sealing materials shall be compatible with the pipe and fitting materials on which the sealing materials are used.

### G2415.5 (404.5) Fittings in Concealed Locations

**Change Type:** Clarification

- Plugs and caps have been added to the list of threaded fittings approved for concealed locations.



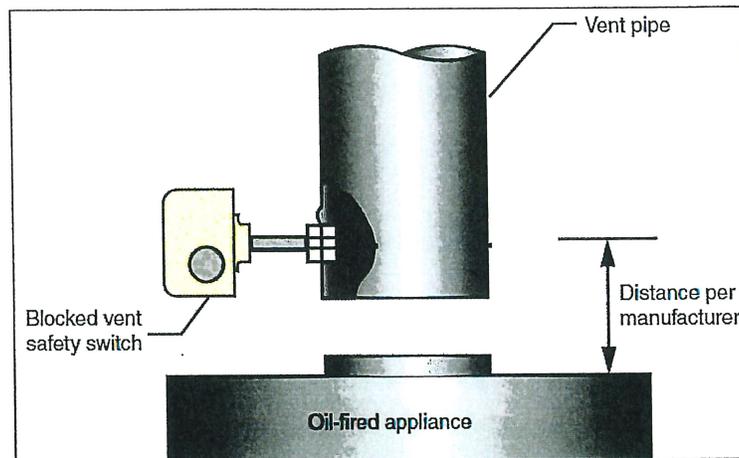
**G2415.5 (404.5) Fittings in concealed locations.** Fittings installed in concealed locations shall be limited to the following types:

1. Threaded elbows, tees, couplings, **plugs and caps.**
2. Brazed fittings.
3. Welded fittings.
4. Fittings listed to ANSI LC-1/CSA 6.26 or ANSI LC-4/CSA 6.32.

## M1802.4 (801.21) Blocked Vent Switch for Oil-fired Appliances

**Change Type:** Addition

- Device will stop burner operation if venting system is obstructed.
- Requires a manual reset.
- Installed in accordance with the manufacturer's instructions.

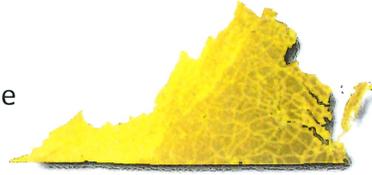


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### N1103.1.3 (VECC R403.1.3) Heat Pump as Primary Space Heat Source

**Change Type:** VA Addition (proposal REC-R403.1.2-21)

- This new VA Amendment prohibits electric resistance heat (like “baseboard heaters”) from being installed as the primary heat source **IF a ducted or ductless heat pump can be installed.**
- This type of heating may continue to be used for “defrost, supplemental, or emergency heat”.
- Heat pumps must be designed so that supplemental resistance heat does not energize unless the outdoor temperature is below 40°F, except during defrost or emergency heating modes.



#### **N1103.1.3 (R403.1.3) Heat pump as primary space heat source.**

Electric resistance heat shall not be used as the primary heat source for electric space heating if a ducted or ductless heat pump can be installed. Electric resistance space heating may be used for defrost, supplemental, or emergency heat. A heat pump shall be designed so that, except during defrost or emergency heating modes, supplemental heating does not energize unless the outdoor temperature is below 40°F (4°C).

### **N1103.3.3 N1103.3.5 Duct Testing**

**Change Type:** Modification

- This section has been updated with current test standards and the exception language has been modified significantly.
- **Ducts and air handlers entirely within the building thermal envelope are no longer exempt from testing**, and the exception now applies only to “ducts serving heating, cooling or ventilation systems **that are not integrated** with ducts serving heating or cooling systems.”

**N1103.3.3 (R403.3.3) N1103.3.5 (R403.3.5) Duct testing. Ducts shall be pressure tested in accordance with ANSI/RESNET/ICC 380 or ASTM E1554 to determine air leakage by one of the following methods:**

1. Rough-in test: *(code text unchanged - not shown)*
2. Postconstruction test: *(code text unchanged - not shown)*

**Exception: A duct air-leakage test shall not be required ~~where the ducts and air handlers are located entirely within the building thermal envelope.~~ for ducts serving heating, cooling or ventilation systems that are not integrated with ducts serving heating or cooling systems.**

*(remaining section text unchanged – not shown)*

## 2021 Virginia Mechanical Code

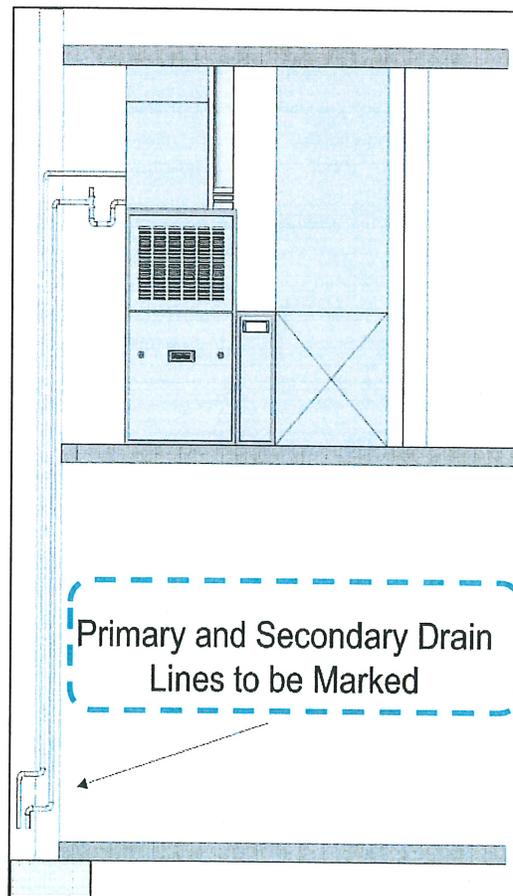
### 307.1.1, 307.2.3.3 Identification

**Change Type:** Addition

- Two NEW sections have been added, requiring primary and secondary condensate drain lines to be marked at their termination.

**(Fuel-burning appliances) 307.1.1 Identification.** The termination of concealed condensate piping shall be marked to indicate whether the piping is connected to the primary or to the secondary drain.

**(Evaporators and Cooling coils) 307.2.3.3 Identification.** The termination of concealed condensate piping shall be marked to indicate whether the piping is connected to the primary or to the secondary drain.



## 401.4, 501.3.1 Intake Opening and Exhaust Outlet Locations

**Change Type:** Modification

- A new type of factory-built combination exhaust and intake air fitting is introduced that does not require separation between the two openings.



**401.4 Intake Opening Location Item #3.** Intake openings shall be located not less than 3 feet (914 mm) below contaminant sources where such sources are located within 10 feet (3048 mm) of the opening. **Separation is not required between intake air openings and living space exhaust air openings of an individual dwelling unit or sleeping unit where an approved factory-built intake/exhaust combination termination fitting is used to separate the air streams in accordance with the manufacturer's instructions.**

**501.3.1 Location of exhaust outlets.** Intake Opening and Location Item #3. For all environmental air exhaust: 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable openings into buildings for all occupancies other than Group U; and 10 feet (3048 mm) from mechanical air intakes. Such exhaust shall not be considered hazardous or noxious. **Separation is not required between intake air openings and living space exhaust air openings of an individual dwelling unit or sleeping unit where an approved factory-built intake/exhaust combination termination fitting is used to separate the air streams in accordance with the manufacturer's instructions.**

## 502.20 Manicure and Pedicure Station Exhaust System

**Change Type:** Modification

- Required exhaust systems in nail salons are often not operated as intended, for reasons including fan noise, saving energy, and neglecting to turn on the system.
- This new code section will require the exhaust system to operate continuously while the space is occupied, which presumably means during the hours that the salon is open for business.

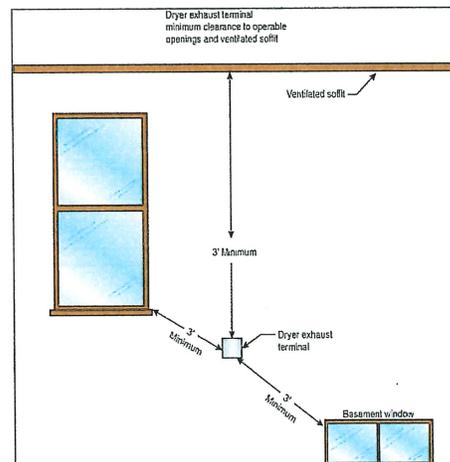


**502.20.1 Operation.** The exhaust system for manicure and pedicure stations shall have controls that operate the system continuously when the space is occupied.

## 504.4.1 Termination Location for Dryer Exhaust

**Change Type:** Modification

- Previously, the code did not address the required separation between building openings and clothes dryer exhaust terminations.
- This new section defers to the appliance installation instructions, and if the instructions are silent on the matter, a 3-foot minimum separation distance is specified.



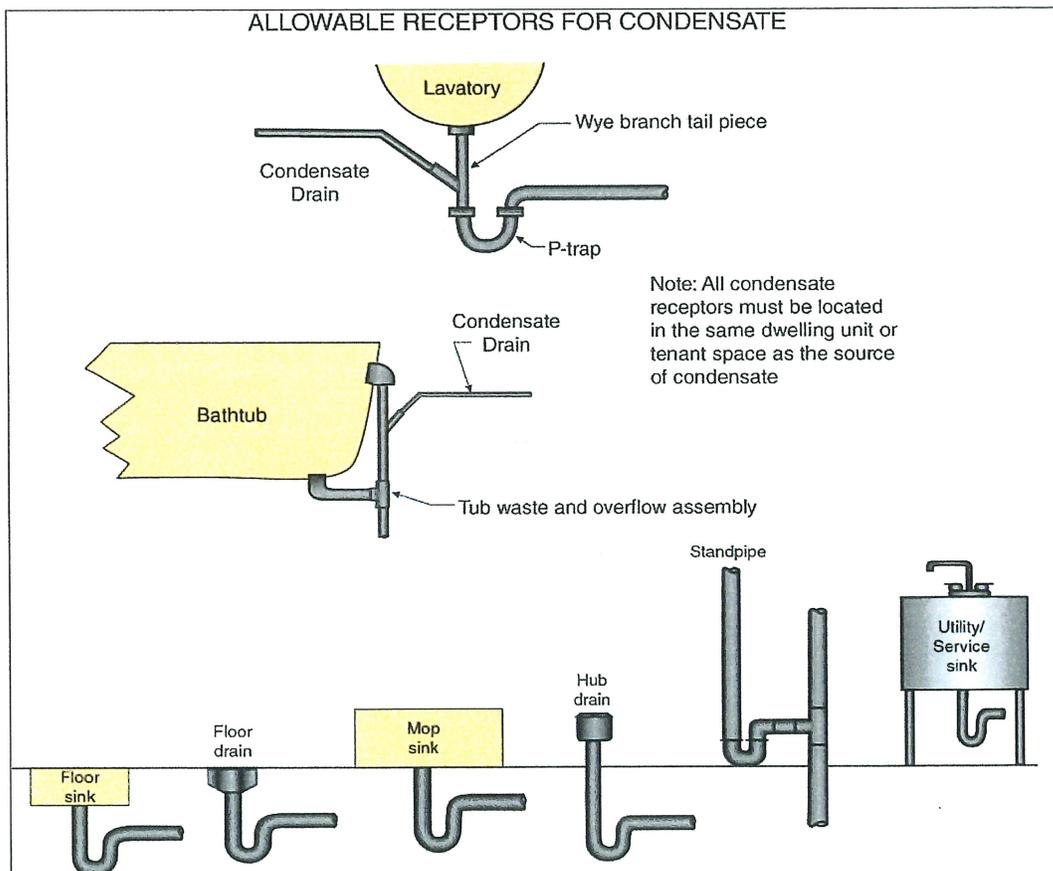
**504.4.1 Termination location.** Exhaust duct terminations shall be in accordance with the dryer manufacturer's installation instructions. Where the manufacturer's instructions do not specify a termination location, the exhaust duct shall terminate not less than 3 feet (914 mm) in any direction from openings into buildings including openings in ventilated soffits.

### 307.2.1.1 Condensate Discharge

**Change Type:** Addition

- New requirements have been added for the condensate point of discharge.

**307.2.1.1 Condensate discharge.** Condensate drains shall not directly connect to any plumbing drain, waste or vent pipe. Condensate drains shall not discharge into a plumbing fixture other than a floor sink, floor drain, trench drain, mop sink, hub drain, standpipe, utility sink or laundry sink. Condensate drain connections to a lavatory wye branch tailpiece or to a bathtub overflow pipe shall not be considered as discharging to a plumbing fixture. Except where discharging to grade outdoors, the point of discharge of condensate drains shall be located within the same occupancy, tenant space or dwelling unit as the source of the condensate.



## 402.7, 202 Maximum Operating Pressure (Press-Connect Joint)

**Change Type:** Addition

- The code now recognizes press-connect joints as suitable for high pressure (over 5 psig) applications indoors and the definition is added to the VFGC/IFGC.

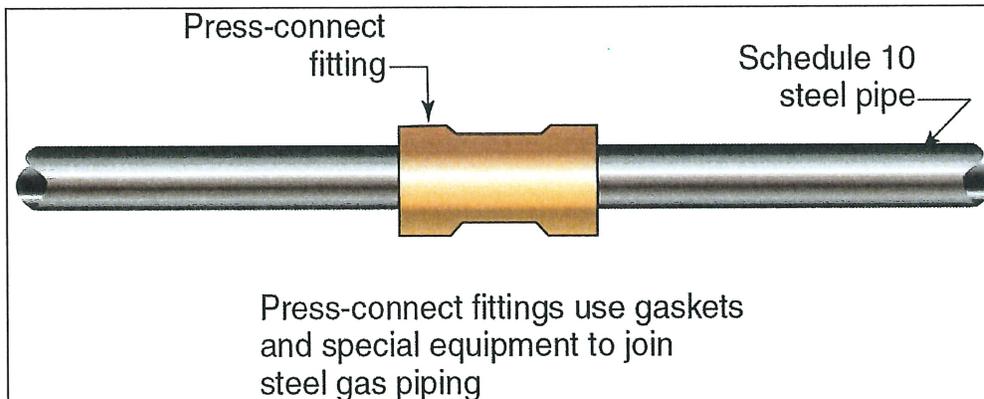
### **PRESS-CONNECT JOINT**

A permanent mechanical joint incorporating an elastomeric seal or an elastomeric seal and corrosion-resistant grip or bite ring. The joint is made with a pressing tool and jaw or ring approved by the fitting manufacturer.

**402.7 Maximum operating pressure.** The maximum operating pressure for piping systems located inside buildings shall not exceed 5 pounds per square inch gauge (psig) (34 kPa gauge) except where one or more of the following conditions are met:

**2. The piping is joined by fittings listed to ANSI LC-4/CSA 6.32 and installed in accordance with the manufacturer's instructions.**

(Items 1, and 3 through 8 are unchanged)



## 623.2 Prohibited Location (Commercial Cooking Appliances)

Change Type: Modification

- Exception #2 for commercial cooking appliances within dwelling units has been deleted.



**623.2 Prohibited location.** Cooking appliances designed, tested, listed and labeled for use in commercial occupancies shall not be installed within dwelling units or within any area where domestic cooking operations occur.

**Exceptions:**

**1. Appliances that are also listed as domestic cooking appliances.**

**2. Where the installation is designed by a licensed Professional Engineer, in compliance with the manufacturer's installation instructions.**

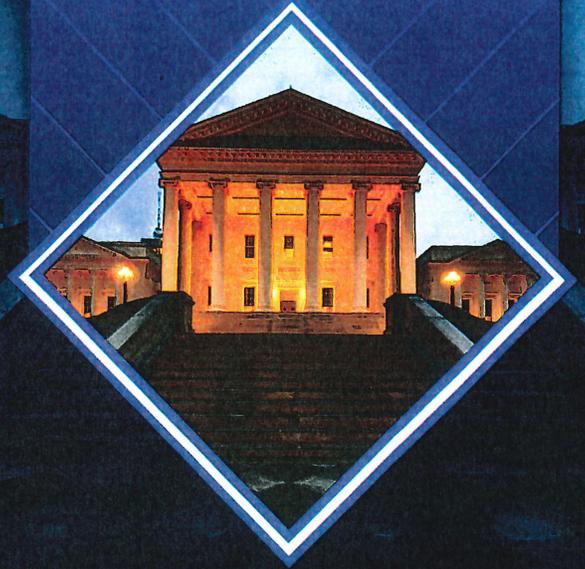
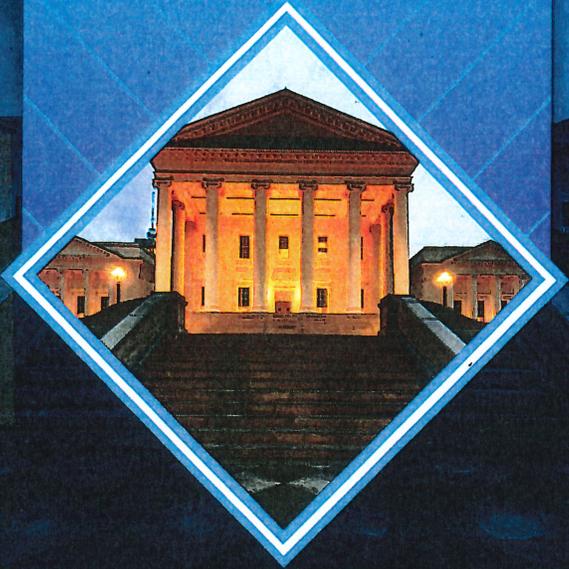
ANY

QUESTIONS?



2021

2021



**Virginia  
Residential Code**



**Virginia  
Construction Code**



**16**  
**SIGNIFICANT  
CHANGES**

**1602.1, 1603.1.4, 1605.1, 1607.14, 1609.5, 1609.6, 2308.2.3 Tornado Loads**

State Code Change



- Virginia now designated as a tornado prone region
- Provisions specific to tornado loads have been added
- Revised definitions for:
  - [BS] ESSENTIAL FACILITIES. Buildings and other structures that are intended to remain operational in the event of extreme environmental loading from flood, wind, tornadoes, snow or earthquakes.
  - [BS] NOMINAL LOADS. The magnitudes of the loads specified in Chapter 16 (dead, live, soil, wind, tornado, snow, rain, flood and earthquake).
  - [BS] RISK CATEGORY. A categorization of buildings and other structures for determination of flood, wind, tornado, snow, ice and earthquake loads based on the risk associated with unacceptable performance.

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## R301.1.4 Intermodal Shipping Containers

**Change Type:** Addition

- Provisions for construction with intermodal shipping containers are added to the VRC/IRC by referencing the **structural provisions of new VCC/IBC Section 3115**.
- **Additionally, ICC G5 is available for guidance** – *Guideline for the Safe Use of ISO Shipping Containers Repurposed as Buildings and Building Components*.

**R301.1.4 Intermodal shipping containers.** Intermodal shipping containers that are repurposed for use as buildings or structures, shall be designed in accordance with the structural provisions in Section 3115 of the International Building Code.

### **OVERVIEW - IBC/VCC SECTION 3115 (not all subsections shown)**

#### SECTION 3115 INTERMODAL SHIPPING CONTAINERS

##### 3115.8 Structural.

##### 3115.8.1 Foundations

##### 3115.8.2 Welds

##### 3115.8.3 Structural Design

##### 3115.8.4 Detailed design procedure

##### 3115.8.5 Simplified structural design of single-unit containers.

##### TABLE 3115.8.5.3 ALLOWABLE SHEAR VALUES FOR INTERMODAL SHIPPING CONTAINER CORRUGATED STEEL WALLS FOR WIND OR SEISMIC LOADING

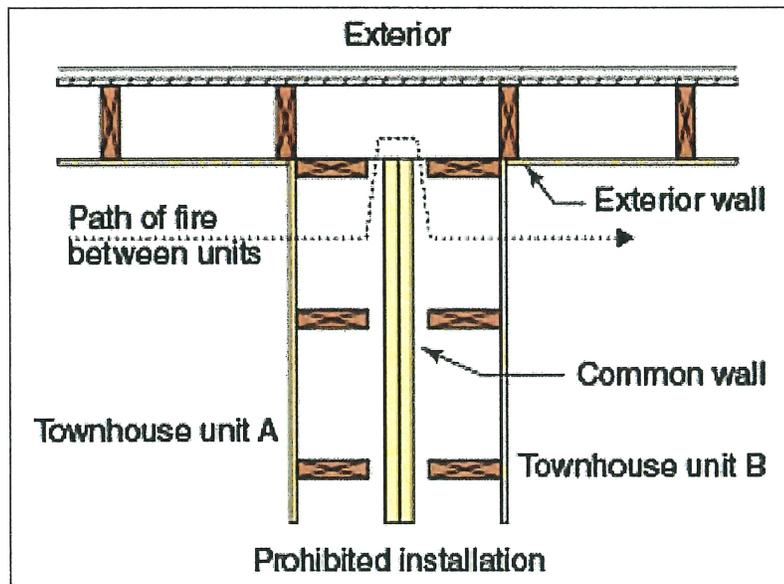
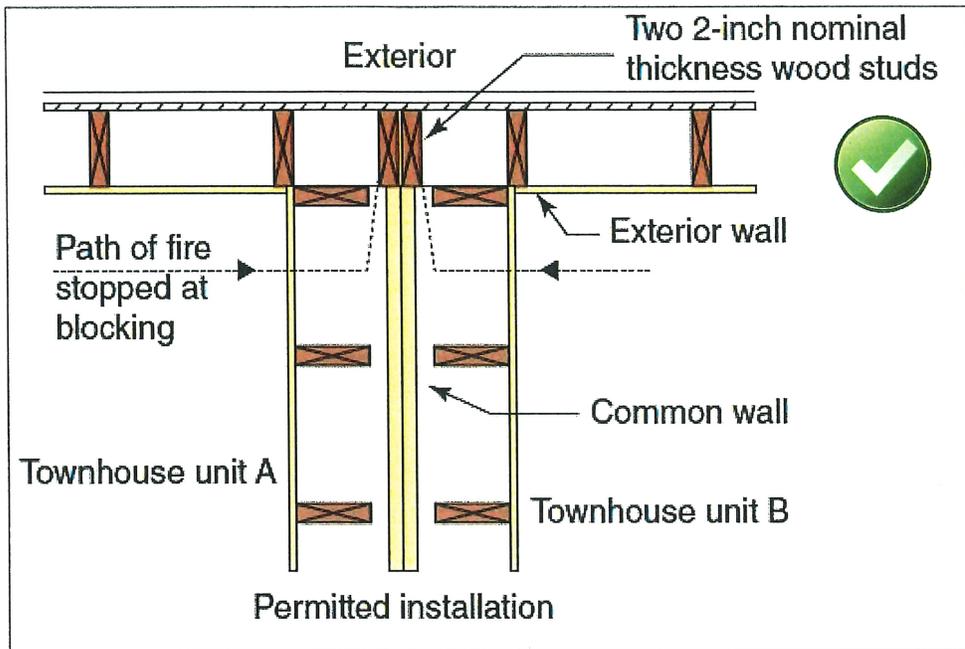
##### FIGURE 3115.8.5.3(1) BRACING UNIT DISTRIBUTION—MAXIMUM LINEAR LENGTH

##### FIGURE 3115.8.5.3(2) BRACING UNIT DISTRIBUTION—MINIMUM LINEAR LENGTH

##### FIGURE 3115.8.5.3(3) BRACING UNIT DISTRIBUTION—BOUNDARY ELEMENTS

##### FIGURE 3115.8.5.3(4) BRACING UNIT DISTRIBUTION—PENETRATION LIMITATIONS

R302.2 Townhouse Common Wall, continued



## R305.1 Ceiling Height

### Change Type: Modification

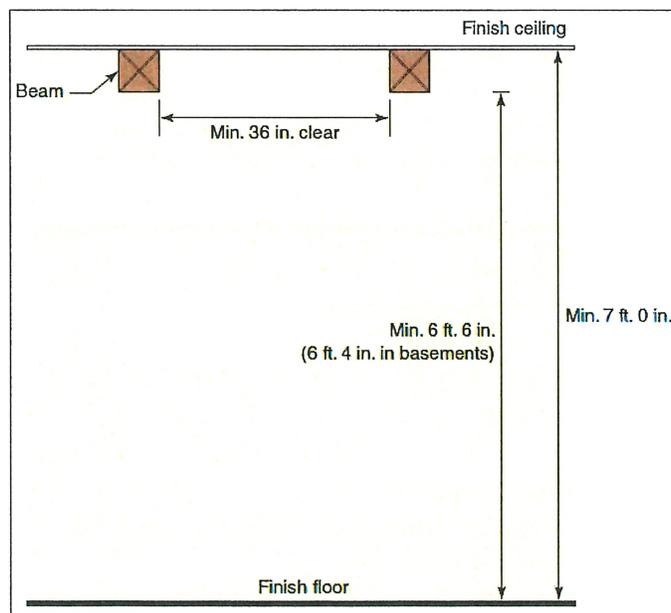
- Minimum ceiling height is reduced to 6 ft. 6 in. under beams spaced at least 36 in. apart.

**R305.1 Minimum height.** Habitable space, hallways and portions of basements containing these spaces shall have a ceiling height of not less than 7 feet (2134 mm). Bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

#### Exceptions:

- For rooms with sloped ceilings, the required floor area of the room shall have a ceiling height of not less than 5 feet (1524 mm) and not less than 50 percent of the required floor area shall have a ceiling height of not less than 7 feet (2134 mm).
- The ceiling height above bathroom and toilet room fixtures shall be such that the fixture is capable of being used for its intended purpose. A shower or tub equipped with a showerhead shall have a ceiling height of not less than 6 feet 8 inches (2032 mm) above an area of not less than 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.
- Beams, girders, ducts or other obstructions in basements containing habitable space shall be permitted to project to within 6 feet 4 inches (1931 mm) of the finished floor.

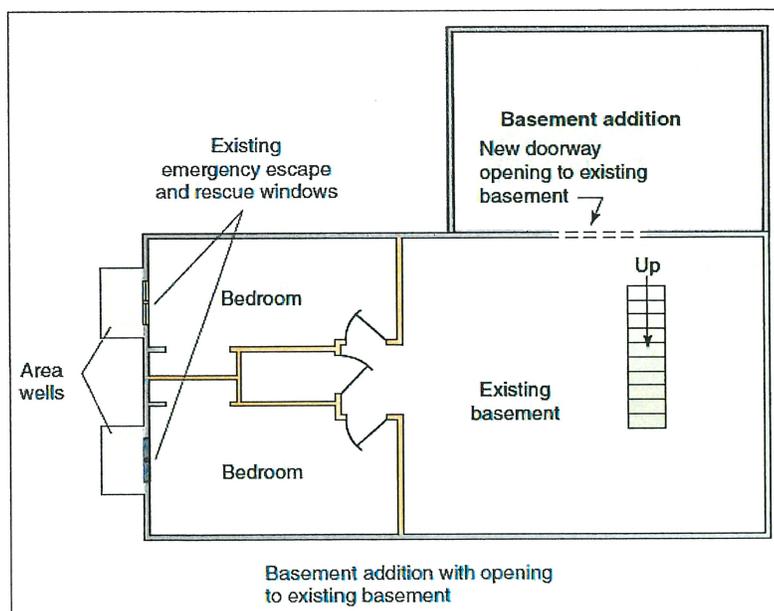
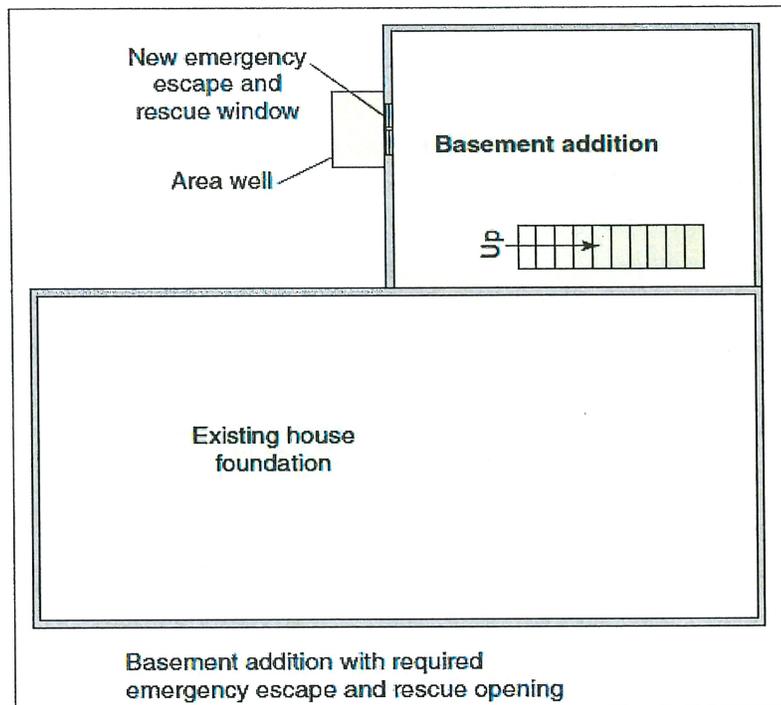
**4. Beams and girders spaced apart not less than 36 inches (914 mm) in clear finished width shall project not more than 78 inches (1981 mm) from the finished floor.**



## R310.5, R310.6, R310.7 EERO in Existing Buildings

### Change Type: Modification

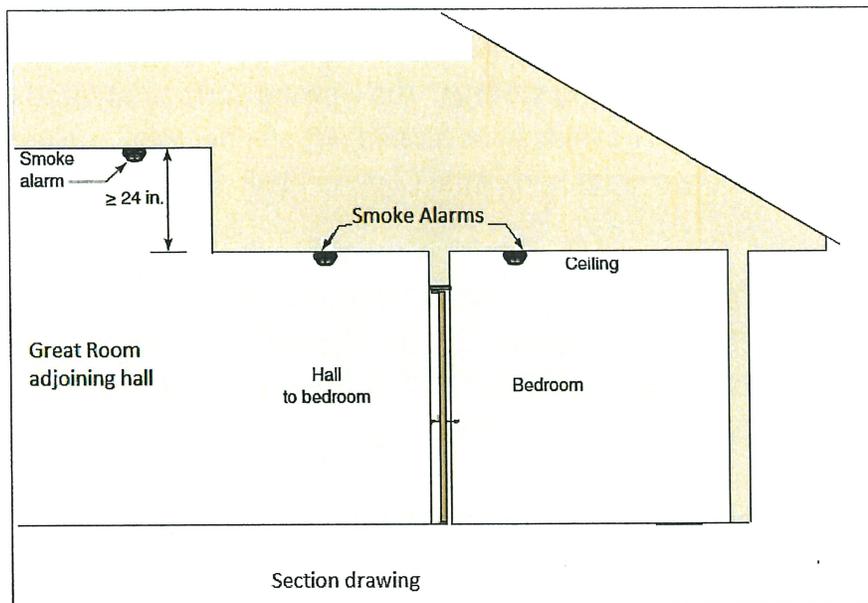
- A 4 sq. ft. clear opening for EERO is acceptable for a basement remodel, basement addition, and for a change of occupancy



### R314.3 Smoke Alarm Locations

**Change Type:** Modification

- A new location requirement addresses high ceilings adjacent to hallways serving bedrooms.



**R314.3 Location.** Smoke alarms shall be installed in the following locations:

1. In each sleeping room.
2. Outside each separate sleeping area in the immediate vicinity of the bedrooms.
3. On each additional story of the dwelling, including basements and habitable attics and not including crawl spaces and uninhabitable attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.
4. Not less than 3 feet (914 mm) horizontally from the door or opening of a bathroom that contains a bathtub or shower unless this would prevent placement of a smoke alarm required by this section.
5. **In the hallway and in the room open to the hallway in dwelling units where the ceiling height of a room open to a hallway serving bedrooms exceeds that of the hallway by 24 inches (610 mm) or more.**

## R324.6.2 Setback at Ridge

**Change Type:** VA Modification (proposal RB324.6.2-21)

- This change greatly simplifies the requirements for setbacks at a horizontal ridge into one sentence.



### **VRC R324.6.2 Setback at ridge.**

~~For photovoltaic arrays occupying not more than 33 percent of the plan view total roof area,~~ **Not less than an 18-inch (457 mm) clear setback is required on both sides of a horizontal ridge.** ~~For photovoltaic arrays occupying more than 33 percent of the plan view total roof area, not less than a 36-inch (914 mm) clear setback is required on both sides of a horizontal ridge.~~

### ~~R324.6.2.1 Alternative setback at ridge.~~

~~Where an automatic sprinkler system is installed within the dwelling in accordance with NFPA 13D or Section P2904, setbacks at ridges shall comply with one of the following:~~

- ~~1. For photovoltaic arrays occupying not more than 66 percent of the plan view total roof area, not less than an 18-inch (457 mm) clear setback is required on both sides of a horizontal ridge.~~
- ~~2. For photovoltaic arrays occupying more than 66 percent of the plan view total roof area, not less than a 36-inch (914 mm) clear setback is required on both sides of a horizontal ridge.~~

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## R506.2.3 Vapor Retarders under Concrete Slabs

### Change Type: Modification

- Minimum thickness of required vapor retarders below floor slabs has increased from 6 mil to 10 mil

**R506.2.3 Vapor retarder.** A minimum 6-mil 10-mil (0.006-0.010 inch; 152 mm 0.254 mm) polyethylene or approved vapor retarder conforming to ASTM E1745 Class A requirements with joints lapped not less than 6 inches (152 mm) shall be placed between the concrete floor slab and the base course or the prepared subgrade where a base course does not exist.

**Exception:** The vapor retarder is not required for the following:

1. Garages, utility buildings and other unheated accessory structures.
2. For unheated storage rooms having an area of less than 70 square feet (6.5 m) and carports.
3. Driveways, walks, patios and other flatwork not likely to be enclosed and heated at a later date.
4. Where approved by the building official, based on local site conditions.

## R507.3 Deck Footings

- Footings for freestanding decks on or near the ground have been clarified.

**R507.3 Footings.** Decks shall be supported on concrete footings or other approved structural systems designed to accommodate all loads in accordance with Section R301. Deck footings shall be sized to carry the imposed loads from the deck structure to the ground as shown in Figure R507.3. ~~The footing depth shall be in accordance with Section R403.1.4.~~

**Exceptions:**

1. Footings shall not be required for free Free-standing decks consisting of joists directly supported on grade over their entire length.
2. Footings shall not be required for freestanding decks that meet all of the following criteria:
  - 2.1 The joists bear directly on precast concrete pier blocks at grade without support by beams or posts,
  - 2.2 The area of the deck does not exceed 200 square feet (18.6 m<sup>2</sup>),
  - 2.3 The walking surface is not more than 20 inches (508 mm) above grade at any point within 36 inches (914 mm) measured horizontally from the edge.

### Table R507.3.1 Minimum Footing Size for Decks

**Change Type:** Modification

- Table R507.3.1, minimum footing size for decks, is expanded to offer a minimum footing size decreased from a 12-inch by 12-inch square in the 2018 VRC/IRC to a smaller 7-inch by 7-inch square or 8-inch round footing in the 2021 VRC/IRC based on a new 5 psf tributary area.

**Table Excerpt (2000 psf and  $\geq$  3000 psf columns not shown)**

LIVE OR GROUND SNOW LOAD (psf)	TRIBUTARY AREA (sq. ft.)	SOIL BEARING CAPACITY		
		1500 psf		
		Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)
40	5	7	8	6
	20	10	12	6
	40	14	16	6
50	5	7	8	6
	20	11	13	6
	40	15	17	6
60	5	7	8	6
	20	12	14	6
70	5	7	8	6
	20	12	14	6



**TABLE N1102.1.2 (R402.1.2) TABLE N1102.1.3 (R402.1.3) Insulation Minimum R-Values and Fenestration Requirements by Component<sup>a</sup>**

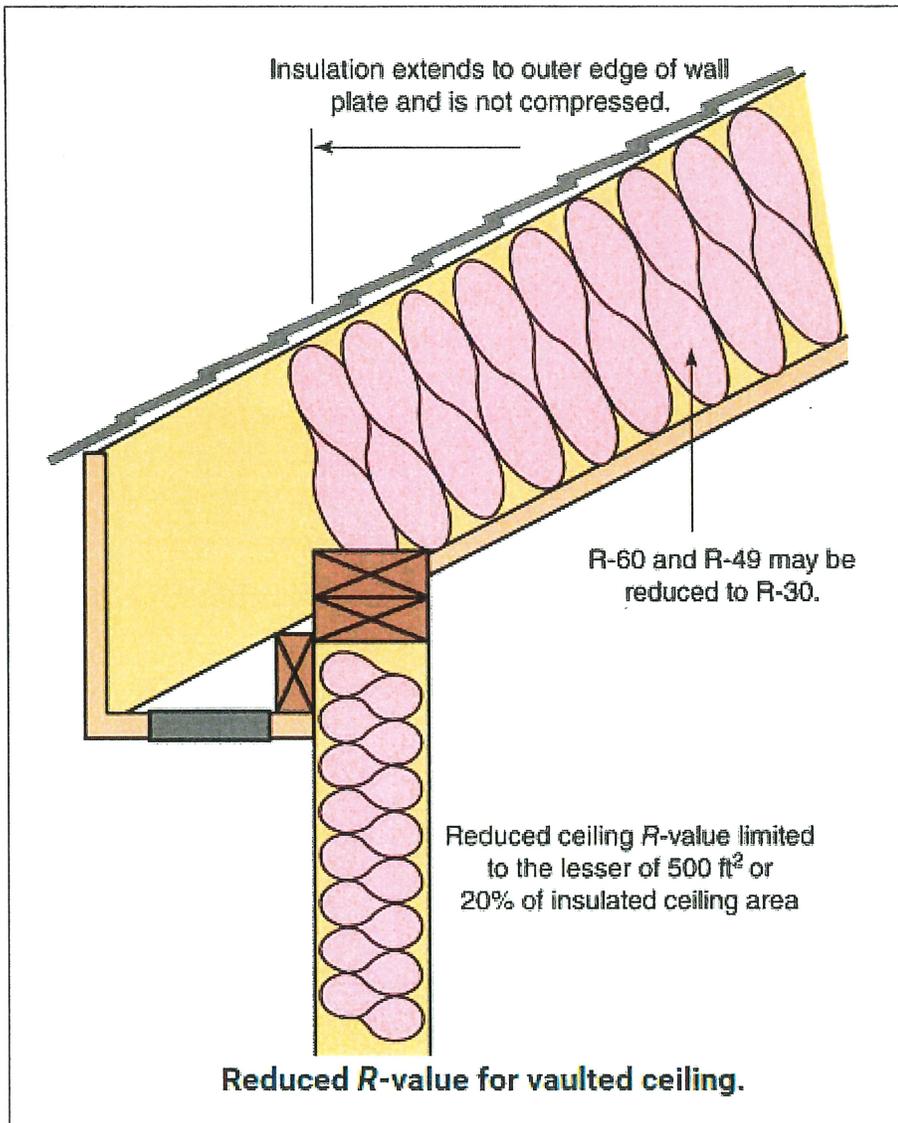
Climate Zone	Fenestration $U$ -Factor <sup>b,i</sup>	Skylight $U$ -Factor <sup>b</sup>	Glazed Fenestration SHGC <sup>b,e</sup>	Ceiling R-Value	Wood Frame Wall R-value <sup>g</sup>	Mass Wall R-value <sup>h</sup>	Floor R-Value	Basement Wall R-Value <sup>c,d</sup>	Slab R-value & Depth <sup>e</sup>	Crawl Space <sup>c,d</sup> Wall R-value
3	<del>0.32</del> <b>0.30</b>	.55	0.25	<del>38</del> <b>49</b>	<del>20 or 13 + 5ci</del> <del>or 0 + 15ci</del> <b>15 or 13 + 1</b>	8/13	19	5ci or 13 <sup>g</sup>	0 <u>10ci, 2</u> ft	5ci /or 13
4 except Marine	<del>0.32</del> <b>0.30</b>	.55	0.40	49 <b>60</b>	<del>20 or 13 + 5ci</del> <del>or 0 + 15ci</del> <b>15 or 13 + 1</b>	8/13	19	10ci or 13	10ci, <u>2-4</u> ft	10 ci or 1 3
5 and Marine 4	0.30	.55	0.40	49 <b>60</b>	<del>20 or 13 + 5ci</del> <del>or 0 + 15ci</del> <b>15 or 13 + 1</b>	13/17	30 <sup>g</sup>	15ci or 19 or 13+5ci	10ci, <u>2-4</u> ft	15ci /or 1 9 or 13+5ci

**Footnote g.** The first value is cavity insulation, the second value is continuous insulation. Therefore, as an example, "13+5" means R-13 cavity insulation plus R-5 continuous insulation.

## N1102.2 Ceiling Insulation

### Change Type: Modification

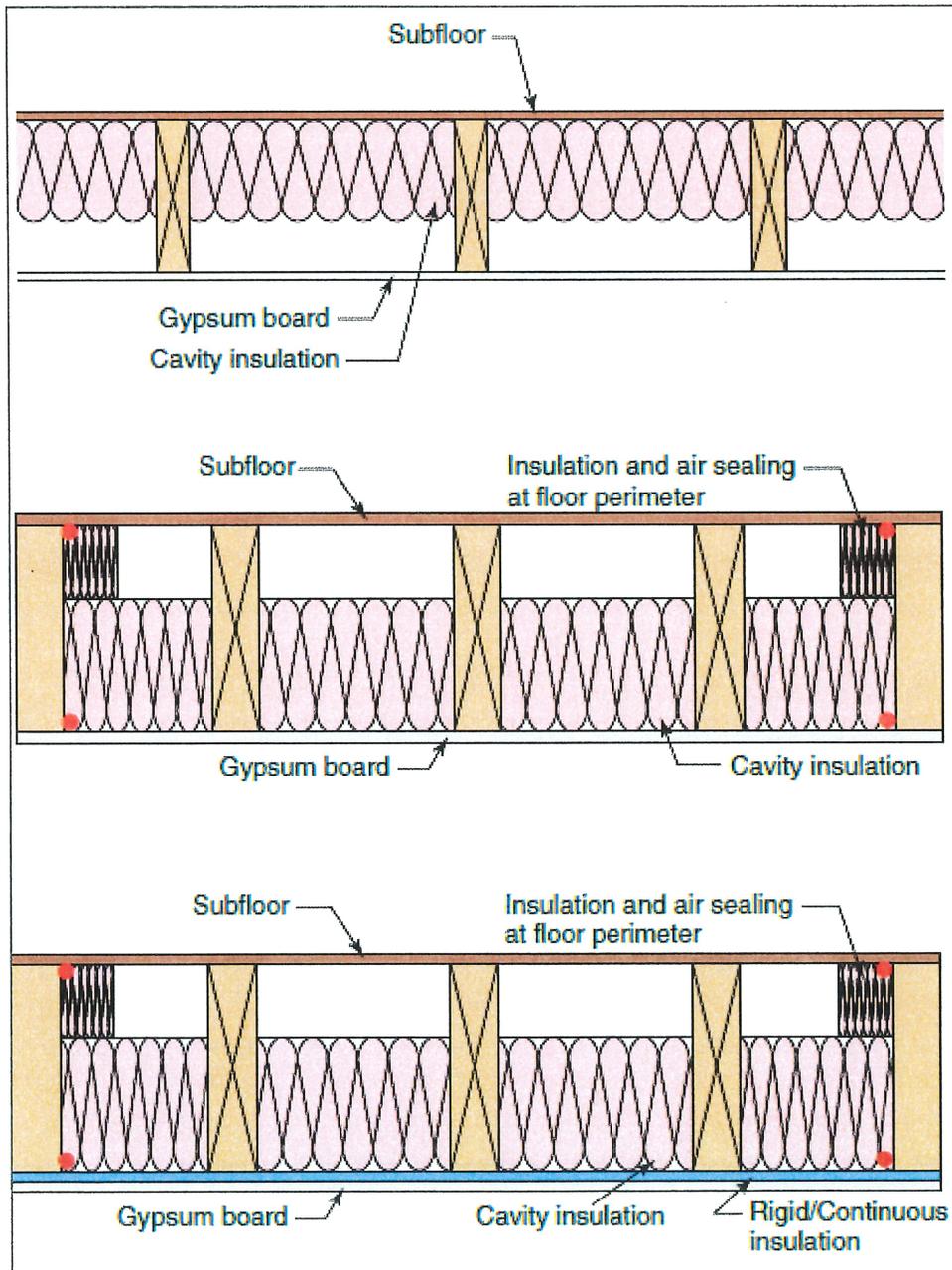
- The options for a reduction in *R*-values for both ceilings with attics and those without have been adjusted to recognize the increase in the prescriptive ceiling *R*-values in Table N1102.1.3.



## N1102.2.7 Floor Insulation

**Change Type:** Clarification

- Three separate methods of compliance:
  - Cavity insulation underside of subfloor
  - Cavity insulation top side of ceiling
  - Cavity and continuous insulation top side of ceiling



## (Appendix) AF104 Radon Testing

**Change Type:** Addition

- Procedures for Radon testing are added to Appendix F.
- For use by localities where radon-resistant construction is required.

### SECTION AF104 - TESTING

**AF104 Testing.** Where radon-resistant construction is required, radon testing shall be as specified in Items 1 through 11:

1. Testing shall be performed after the dwelling passes its air tightness test.
2. Testing shall be performed after the radon control system and HVAC installations are complete. The HVAC system shall be operating during the test. Where the radon system has an installed fan, the dwelling shall be tested with the radon fan operating.
3. Testing shall be performed at the lowest occupied floor level, whether or not that space is finished. Spaces that are physically separated and served by different HVAC systems shall be tested separately.
4. Testing shall not be performed in a closet, hallway, stairway, laundry room, furnace room, bathroom or kitchen.
5. Testing shall be performed with a commercially available radon test kit or testing shall be performed by an approved third party with a continuous radon monitor. Testing with test kits shall include two tests, and the test results shall be averaged. Testing shall be in accordance with this section and the testing laboratory kit manufacturer's instructions.
6. Testing shall be performed with the windows closed. Testing shall be performed with the exterior doors closed, except when being used for entrance or exit. Windows and doors shall be closed for at least 12 hours prior to the testing.
7. Testing shall be performed by the builder, a registered design professional, or an approved third party.
8. Testing shall be conducted over a period of not less than 48 hours or not less than the period specified by the testing device manufacturer, whichever is longer.
9. Written radon test results shall be provided by the test lab or testing party. The final written test report with results less than 4 picocuries per liter (pCi/L) shall be provided to the code official.
10. Where the radon test result is 4 pCi/L or greater, the fan for the radon vent pipe shall be installed as specified in Sections AF103.9 and AF103.12.
11. Where the radon test result is 4 pCi/L or greater, the system shall be modified and retested until the test result is less than 4 pCi/L.

**Exception:** Testing is not required where the occupied space is located above an unenclosed open space.

**[F] 903.2.4, 903.2.7, 903.2.9 Upholstered Furniture and Mattresses**

The sprinkler provisions for upholstered furniture and mattresses have been modified to clearly indicate the scope of the required protection.

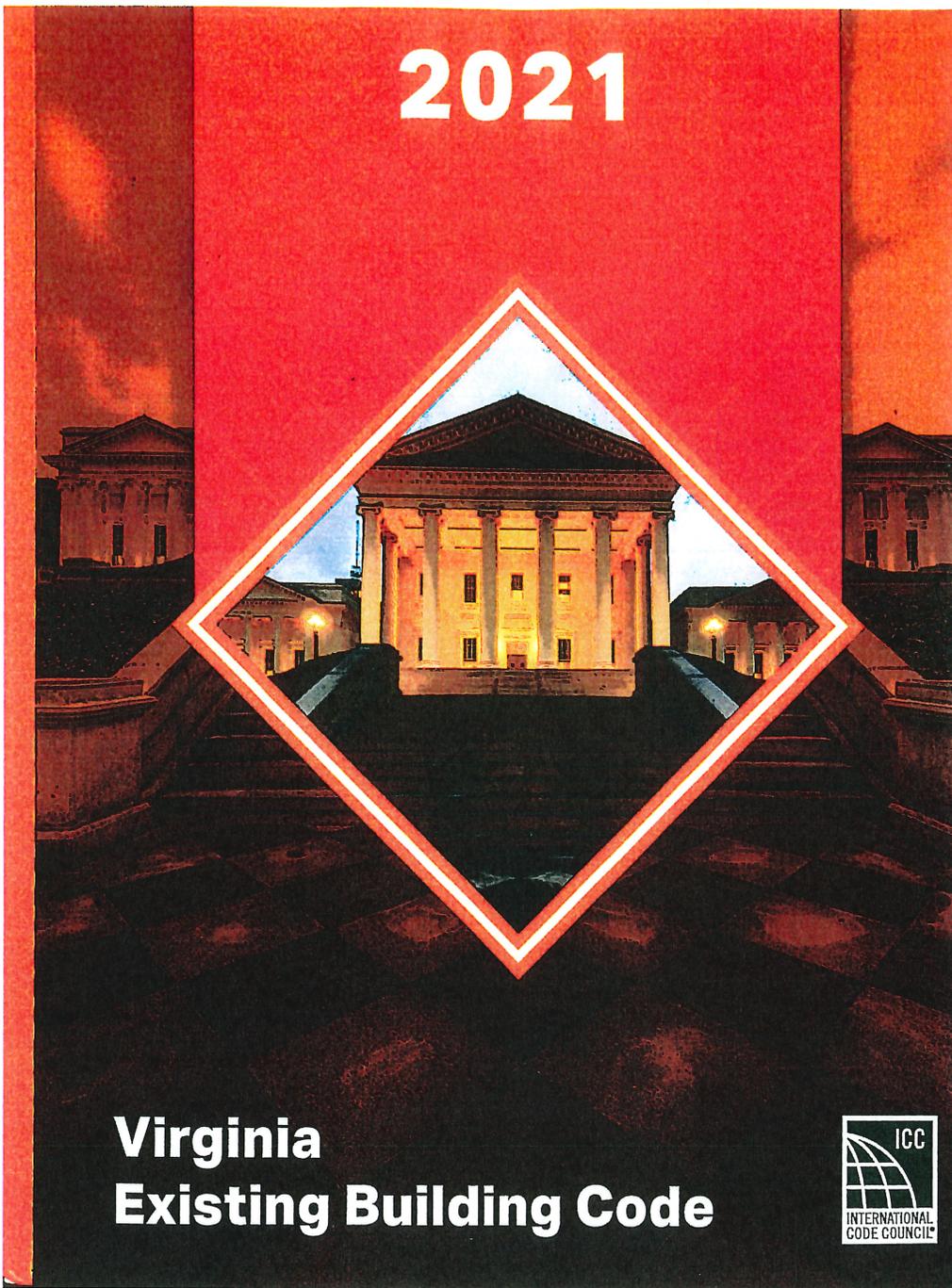
- Sprinkler requirements for Groups F-1 and S-1 where upholstered furniture or mattresses are manufactured, sold or stored have been revised to establish new scope.
  - Group F-1: Area threshold (2,500 ft<sup>2</sup>) now based on size of fire area where upholstered furniture or mattresses are manufactured
  - Group S-1: Area threshold (2,500 ft<sup>2</sup>) now based on size of floor area within fire area used for storage of upholstered furniture or mattresses
- In addition, new exception indicates that one-story Group S-1 self-storage facilities are exempt from 2,500 square foot sprinkler threshold where all storage spaces can be accessed directly from exterior.
  - General Group S-1 sprinkler threshold of 12,000 square feet continues to be applicable.



Any Questions?



**2021**



**Virginia  
Existing Building Code**



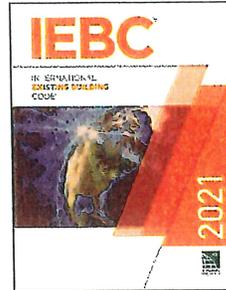
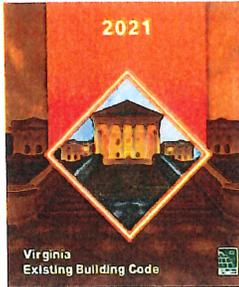
**1**

**SIGNIFICANT  
CHANGE**

## 2021 Virginia Existing Building Code

State Code Change

### 2021 Virginia Existing Building Code



#### **102.2.2 Reconstruction, Alteration, or Repair in Group R-5 Occupancies**

State Code Change

Adds exception, aligning this section with existing requirement in 302.3

- Must meet UL 217 and require 10-year sealed batteries for battery-only replacements

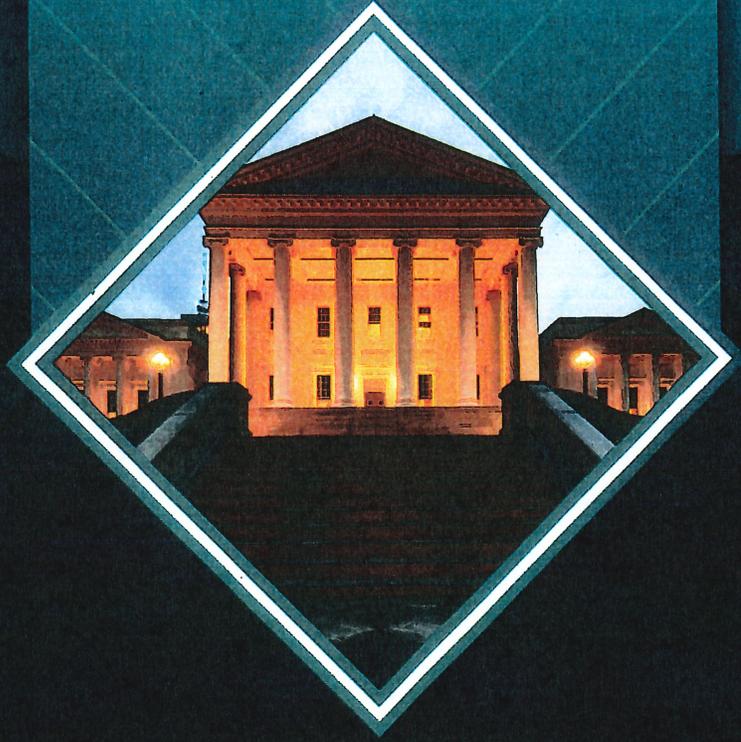
VEBC section 302.3 requires replacement smoke alarms to meet UL 217 and requires 10-year sealed batteries for battery-only replacements. If the R-5 exception was taken to use the VRC instead of the VEBC, this requirement to have current technology replacement smoke alarms is lost. This change brings application of the VRC to R-5 consistent with use of the VEBC for R-5.



ANY  
QUESTIONS?



**2021**



**Virginia  
Plumbing Code**



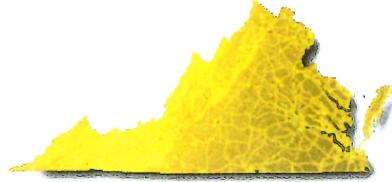
**7**

**SIGNIFICANT  
CHANGES**

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## P2906.9.1.2 (VA) Solvent cementing (CPVC piping)

**Change Type:** Modification (VA)



- This VA amendment adds the option for solvent **green in color** for one-step solvent cementing of CPVC piping and joints when the other conditions for omitting primer are met.
- One-step CPVC cement can now be yellow, red, OR green.
- Green cement stands out better on CPVC pipe and fittings, allowing for installers and inspectors to more easily identify any joints that were not cemented.

## P3005.2.10.1 (708.1.6) Removable Fixture Traps as Cleanouts

- Removable traps and removeable fixtures with integral traps are acceptable for use as cleanouts.

**P3005.2.10.1 (708.1.6) Cleanout Equivalent.** A fixture trap or a fixture with an integral trap, removable without altering the concealed piping shall be acceptable as a cleanout equivalent.

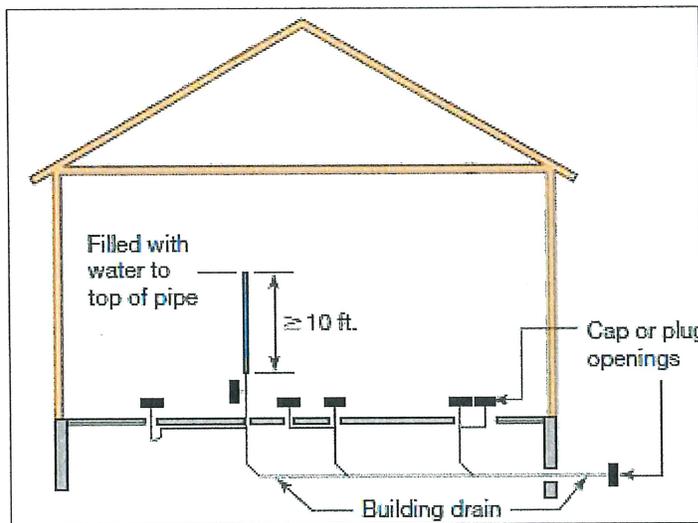


## P2503.5.1 Drain, Waste and Vent Systems Testing

### Change Type: Modification

- The head pressure for a water test of DWV systems has increased to 10 feet (aligns with IPC) and **air vacuum testing is now permitted** for plastic piping DWV systems.

1. Water test. Each section shall be filled with water to a point not less than ~~5~~**10** feet (1524-3048 mm) above the highest fitting connection in that section, or to the highest point in the completed system. Water shall be held in the section under test for a period of 15 minutes. The system shall prove leak free by visual inspection.



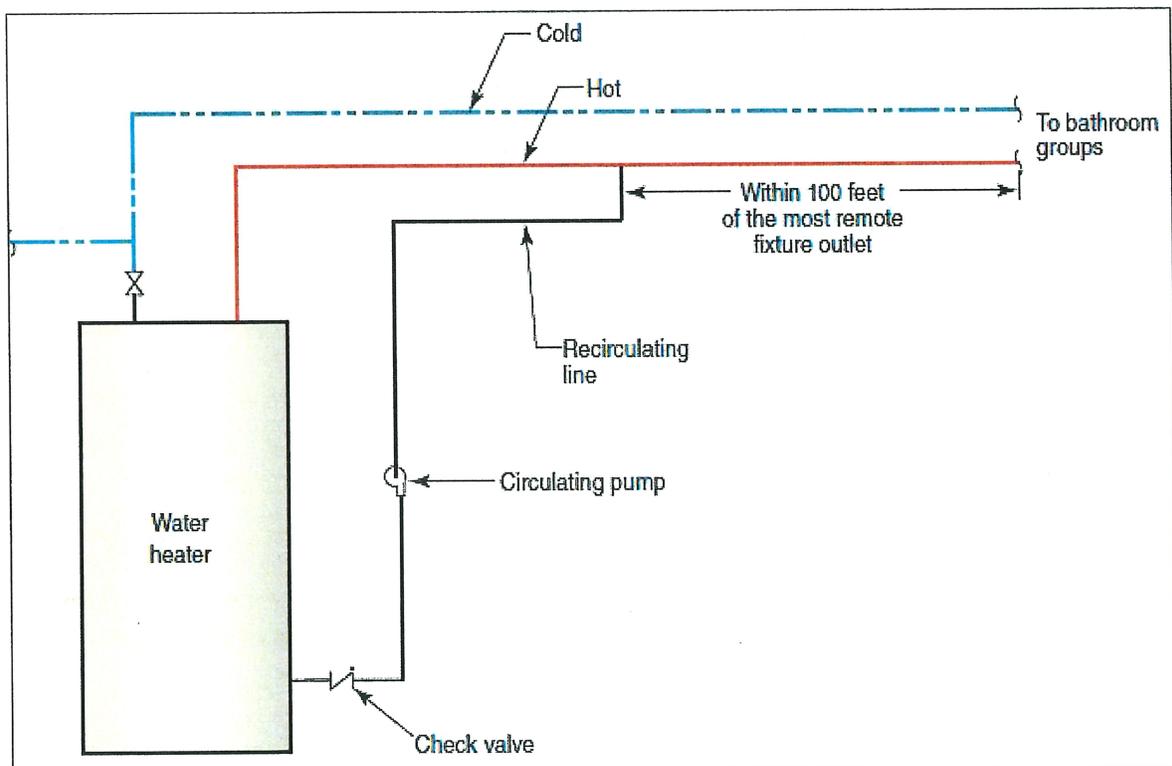
**3. Vacuum Test.** The portion under test shall be evacuated of air by a vacuum type pump to achieve a uniform gauge pressure of -5 pounds per square inch or a negative 10 inches of mercury column (-34 kPa). This pressure shall be held without the removal of additional air for a period of 15 minutes.

## P2905.3 Length of Hot Water Piping to Fixtures

**Change Type:** Addition

- Limits the length of hot water piping serving fixtures to 100 ft. (IPC = 50 ft.)

**P2905.3 Hot water supply to fixtures.** The developed length of hot water piping, from the source of hot water to the fixtures that require hot water, shall not exceed 100 feet (30,480 mm). Water heaters and recirculating system piping shall be considered to be sources of hot water.



## Table 702.3 ABS Building Sewer Pipe Standard

### Change Type: Addition

- Another form of ABS pipe (ABS composite wall ASTM D2680) is added to the table of building sewer pipe standards. The standard covers nominal pipe sizes of 8, 10, 12, and 15 inches
- This form of pipe is a composite wall construction where concentric inner and outer walls are braced by an integral truss-type structure. The resultant annular space between the walls is filled with a Portland cement/pearlite mixture
- The product has a pipe stiffness of at least 200 psi to provide for very low deflection values for deep burial conditions as well as for AASHTO live loading conditions at less than one foot of cover



## 606.1 Individual Tenant Water Shut-off Valve

**Change Type:** Modification

- Multiple tenant buildings must have a main water shutoff valve for each tenant space

**606.1 Location of full-open valves.** Full-open valves shall be installed in the following locations:

1. On the building water service pipe from the public water supply near the curb.
2. On the water distribution supply pipe at the entrance into the structure.

**2.1. In multiple-tenant buildings, where a common water supply piping system is installed to supply other than one- and two-family dwellings, a main shutoff valve shall be provided for each tenant.**

*(Items 3 through 8 remain unchanged)*

## 607.1.1, 607.1.2 Water Heaters Providing Tempered Water to Fixtures

**Change Type:** Modification

- New designs of water heaters are available that provide reliable and accurate control of the temperature of the heated water and are now recognized by the code (standards ASSE 1082 and 1084)

**607.1.2 Tempered water temperature control. Tempered water shall be supplied through a water temperature controlled by one of the following:**

1. ~~A limiting device that conforms~~ conforming to ASSE 1070/ASME A112.1070/CSA B125.70 ~~and shall limit the tempered water to not greater than~~ and set to a maximum of 110°F (43°C).
2. **A thermostatic mixing valve conforming to ASSE 1017.**
3. **A water heater conforming to ASSE 1082.**
4. **A water heater conforming to ASSE 1084.**

Any Questions?



# NEC<sup>®</sup> 2020

NATIONAL ELECTRICAL CODE

INTERNATIONAL ELECTRICAL CODE SERIES

**CODE**



AN INTERNATIONAL CODES AND STANDARDS ORGANIZATION

# 27

# SIGNIFICANT CHANGES

## N1104 Lighting Equipment

**Change Type:** Addition

- High-efficacy lighting is now required in all permanent lighting fixtures.
- New provisions require lighting controls for interior and exterior lighting.

**N1104.1 (R404.1) Lighting equipment (~~Mandatory~~).** ~~Not less than 90 percent of the~~ All permanently installed lighting fixtures, excluding kitchen appliance lighting fixtures, shall contain only high-efficacy lighting sources lamps.

**N1104.2 (R404.2) Interior Lighting Controls.** Permanently installed lighting fixtures shall be controlled with a dimmer, an occupant sensor control or another control that is installed or built into the fixture.

**Exception:** Lighting controls shall not be required for the following:

1. Bathrooms
2. Hallways
3. Exterior lighting fixtures
4. Lighting designed for safety or security

**N1104.3 (R404.3) Exterior lighting controls.** Where the total permanently installed exterior lighting power is greater than 30 watts, the permanently installed exterior lighting shall comply with the following:

1. Lighting shall be controlled by a manual on and off switch that permits automatic shut off actions.

**Exception:** Lighting serving multiple dwelling units.

2. Lighting shall be automatically shut off when daylight is present and satisfies the lighting needs.
3. Controls that override automatic shut off actions shall not be allowed unless the override automatically returns automatic control to its normal operation within 24 hours.

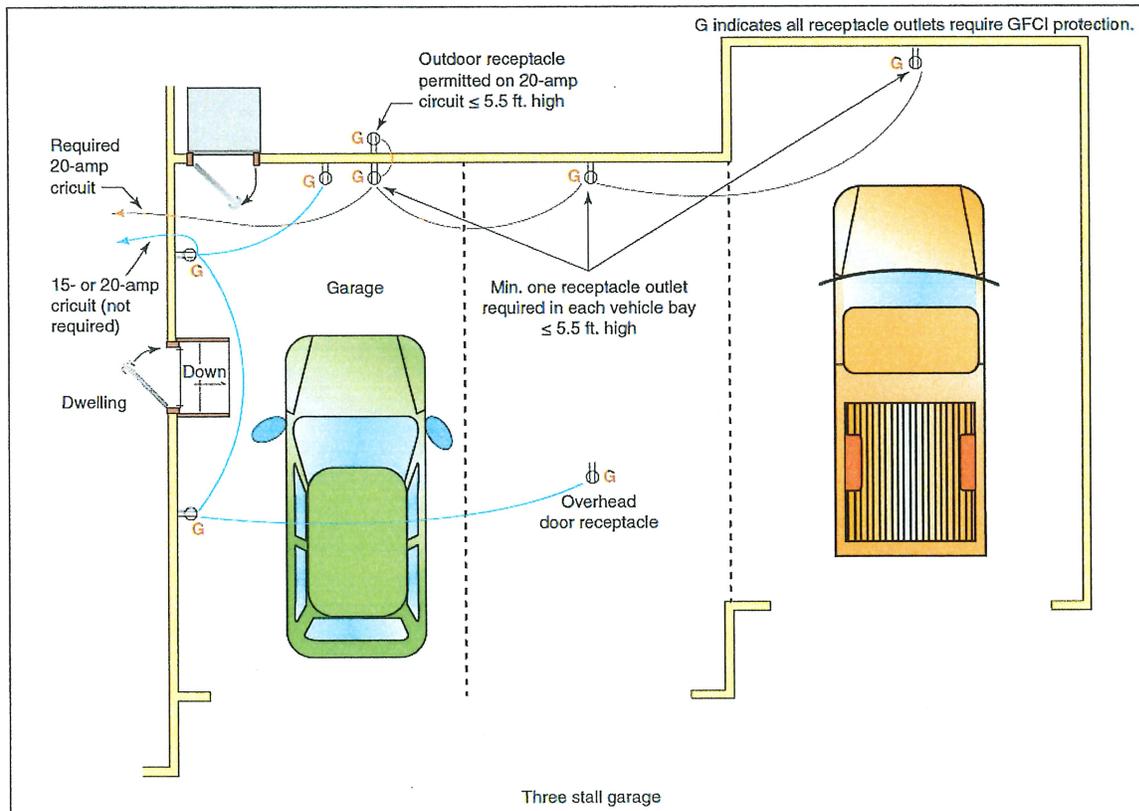
## E3703.5 Garage Branch Circuits [210.11(C)(4)]

**Change Type:** Modification

- Only the required receptacle outlets must be on the 20-amp dedicated circuit for garages.

**E3703.5 Garage Branch Circuits.** In addition to the number of branch circuits required by other parts of this section, not less than one 120-volt, 20-ampere branch circuit shall be installed to supply receptacle outlets required by Section E3901.9 in attached garages and in detached garages with electric power. This circuit shall not have other outlets.

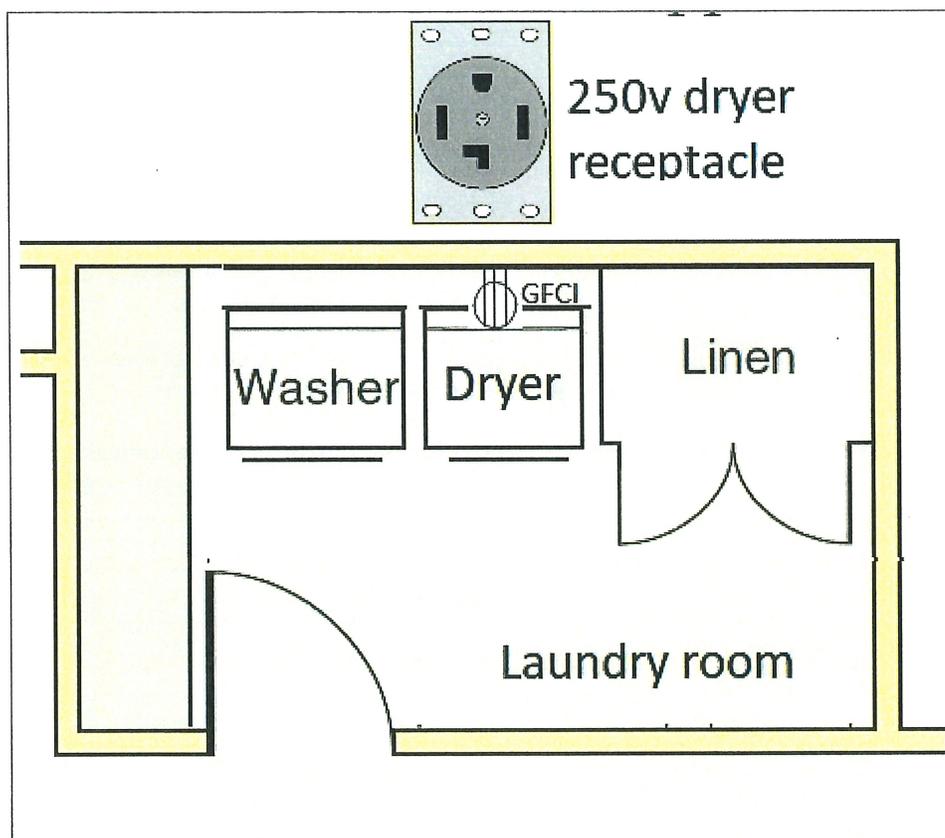
**Exception:** This circuit shall be permitted to supply readily accessible outdoor receptacle outlets.



## E3902 GFCI Protection for 250-Volt Receptacles [210.8(A) – multiple subsections, 210.8(E)]

**Change Type:** Modification

- Ground-fault circuit-interrupter (GFCI) protection is required for up to 250-volt receptacles in the areas previously identified as requiring GFCI protection for 125-volt receptacles.
- The 20-amp limitation has been removed.



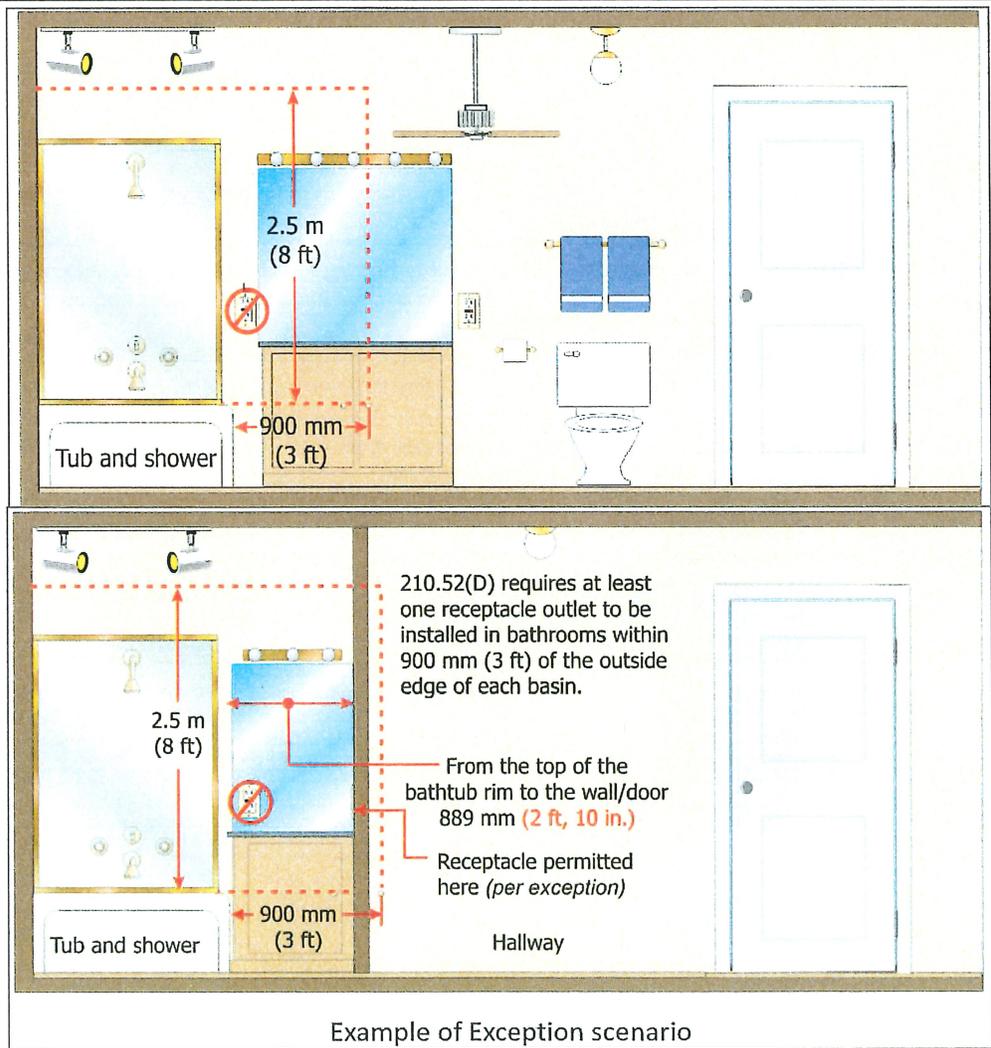
### E4002.11 Bathtub and Shower Space [406.9(C)]

**Change Type:** Modification

- Receptacle outlet(s) located in the area around a bathtub or shower stall have been revised to include a restricted “zone” with an exception added for smaller space bathrooms.

**E4002.11 Bathtub and shower space.** Receptacles shall not be installed within a **zone measured 3 ft horizontally and 8 ft vertically** from the top of the bathtub rim or shower stall threshold. The identified zone is all encompassing and shall include the space directly over the tub or shower stall.

**Exception:** In bathrooms with less than the required zone, the receptacle(s) shall be permitted to be installed opposite the bathtub rim or shower stall threshold on the farthest wall in the room. [406.9(C)]

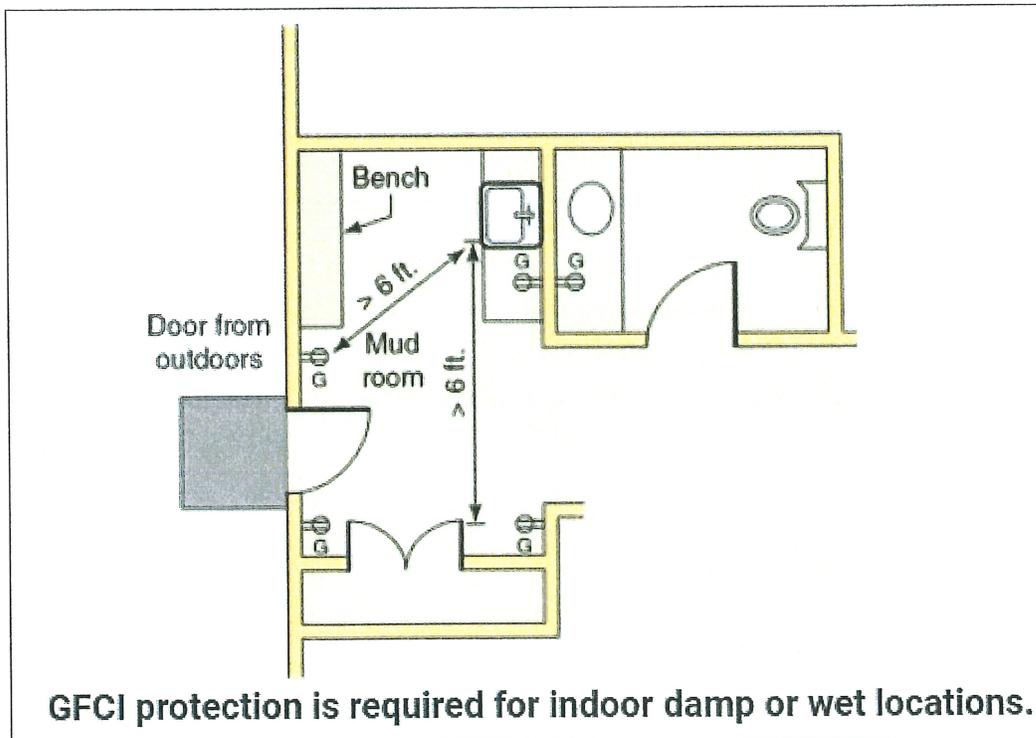


## E3902.10 GFCI Protection for Indoor Damp and Wet Locations [210.8(A)(11)]

**Change Type:** Addition

- GFCI protection is now required for damp and wet locations (not already included in the other specific locations requiring GFCI protection)

**E3902.10 Indoor damp and wet locations.** 125-volt through 250-volt, receptacles installed in indoor damp and wet locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(11)]



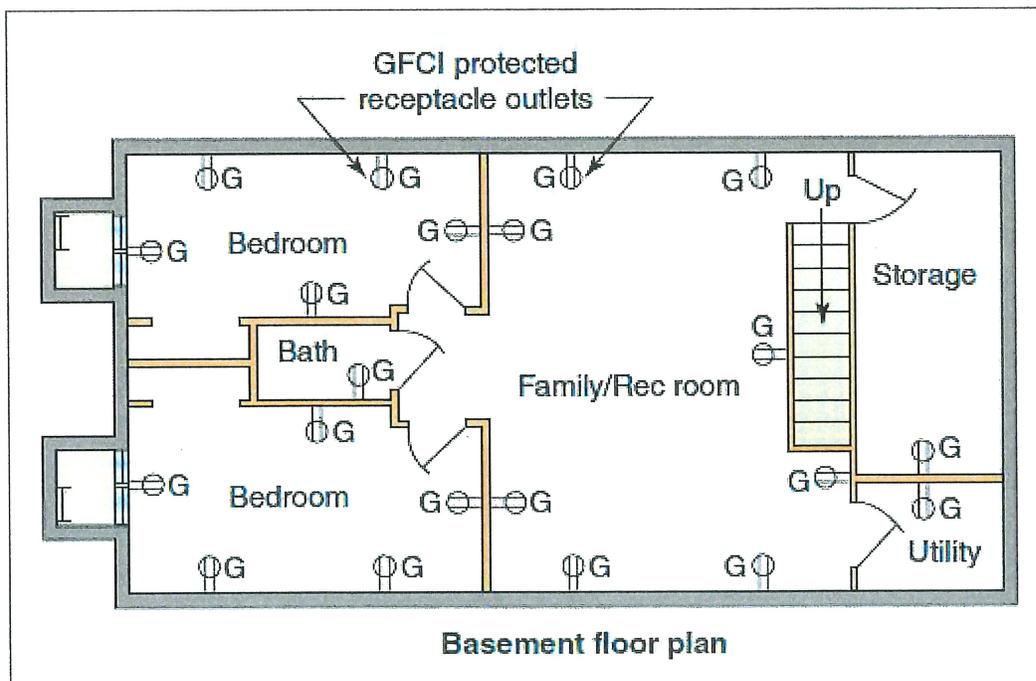
## E3902.5 GFCI Protection for Basement Receptacles [210.8(A)(5)]

### Change Type: Modification

- The requirement for GFCI protection in unfinished basement areas has been expanded to include **all basement areas** – whether finished or unfinished.

**E3902.5 Unfinished basement receptacles.** 125-volt through 250-volt, single-phase, 15- and 20-ampere receptacles installed in unfinished basements **and supplied by single-phase branch circuits rated 150 volts or less to ground** shall have ground-fault circuit-interrupter protection for personnel. For purposes of this section, unfinished basements are defined as portions or areas of the basement not intended as habitable rooms. [210.8(A)(5)]

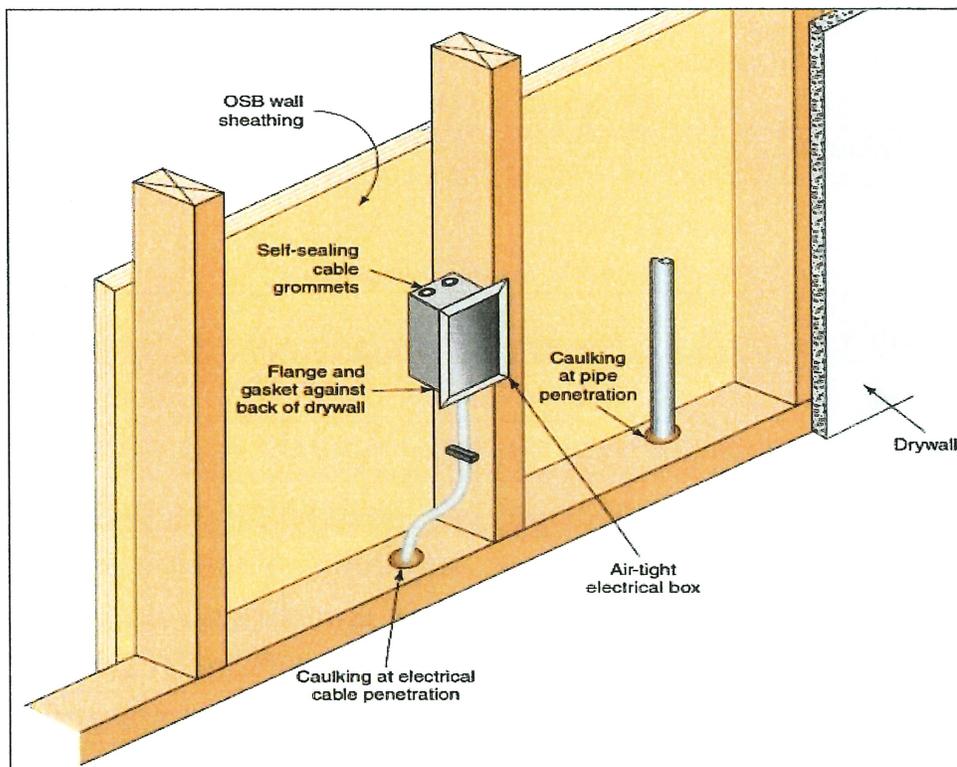
**Exception:** A receptacle supplying only a permanently installed fire alarm or burglar alarm system. Receptacles installed in accordance with this exception shall not be considered as meeting the requirement of Section E3901.9. [210.8(A)(5) Exception]



## N1102.4.6 Air-Sealed Electrical Boxes

**Change Type:** Addition

- Electrical and communication outlet boxes installed **in the building thermal envelope** must be:
  - Sealed
  - Tested NEMA OS 4
  - Marked "NEMA OS 4" or "OS 4"
  - Installed per manufacturer's instructions and NEMA OS 4



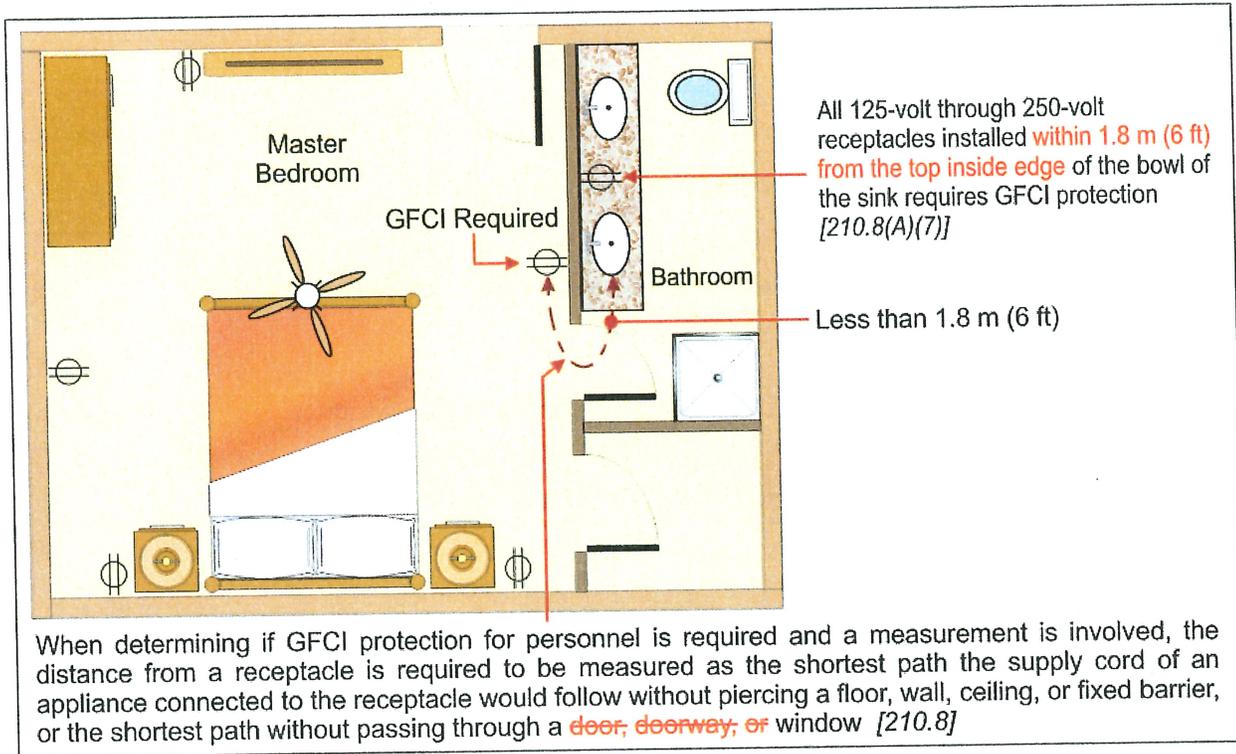
### **N1102.4.6 (R402.4.6) Electrical and communication outlet boxes (air-sealed boxes).**

Electrical and communication outlet boxes installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces. Electrical and communication outlet boxes shall be tested in accordance with NEMA OS 4, Requirements for Air-Sealed Boxes for Electrical and Communication Applications, and shall have an air leakage rate of not greater than 2.0 cubic feet per minute (0.944 L/s) at a pressure differential of 1.57 psf (75 Pa). Electrical and communication outlet boxes shall be marked "NEMA OS 4" or "OS 4" in accordance with NEMA OS 4. Electrical and communication outlet boxes shall be installed per the manufacturer's instructions and with any supplied components required to achieve compliance with NEMA OS 4.

## 210.8 Measurements for GFCI Protection

### Change Type: Revision

- Revision removes “door” and “doorway” as items the supply cord of an appliance connected to the receptacle should not pass through in order to satisfy measurement requirements for GFCI protection.



## 210.8(B) GFCI Protection for other than Dwelling Units

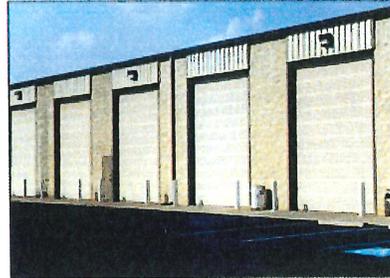
Change Type: New

New provisions for GFCI protection were added for non-dwelling unit locations for receptacles:



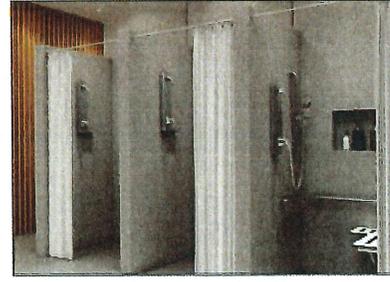
Indoor  
**Damp  
and Wet**  
Locations

Garages,  
**accessory  
buildings,**  
and service  
bays



**Laundry  
areas**

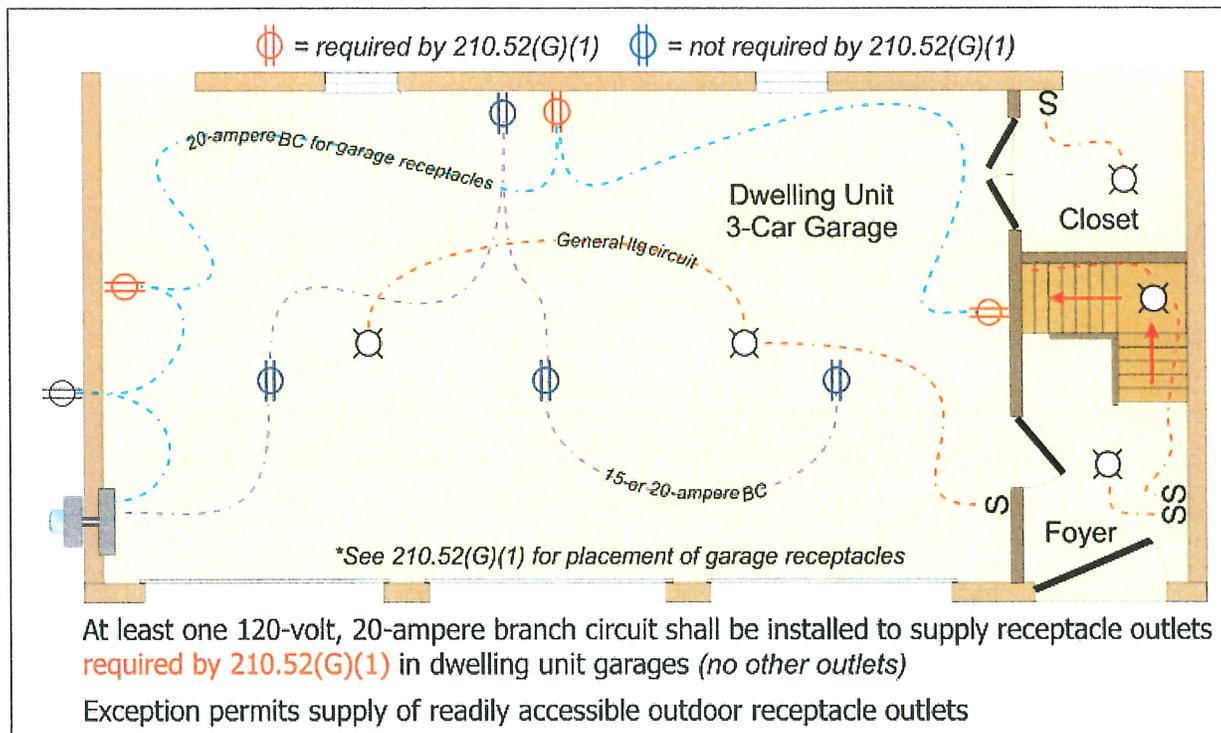
**Bathtubs  
and  
shower  
stalls**



## 210.11(C)(4) Garage Branch Circuit(s)

**Change Type:** Revision

- Garage receptacle outlet 120-volt, 20-ampere branch circuits are only required for the receptacles required by 210.52(G)(1) for attached garages and in detached garages with electric power.



## 210.12(C) AFCI for Patient Sleeping Rooms in Nursing Homes and Limited-Care Facilities

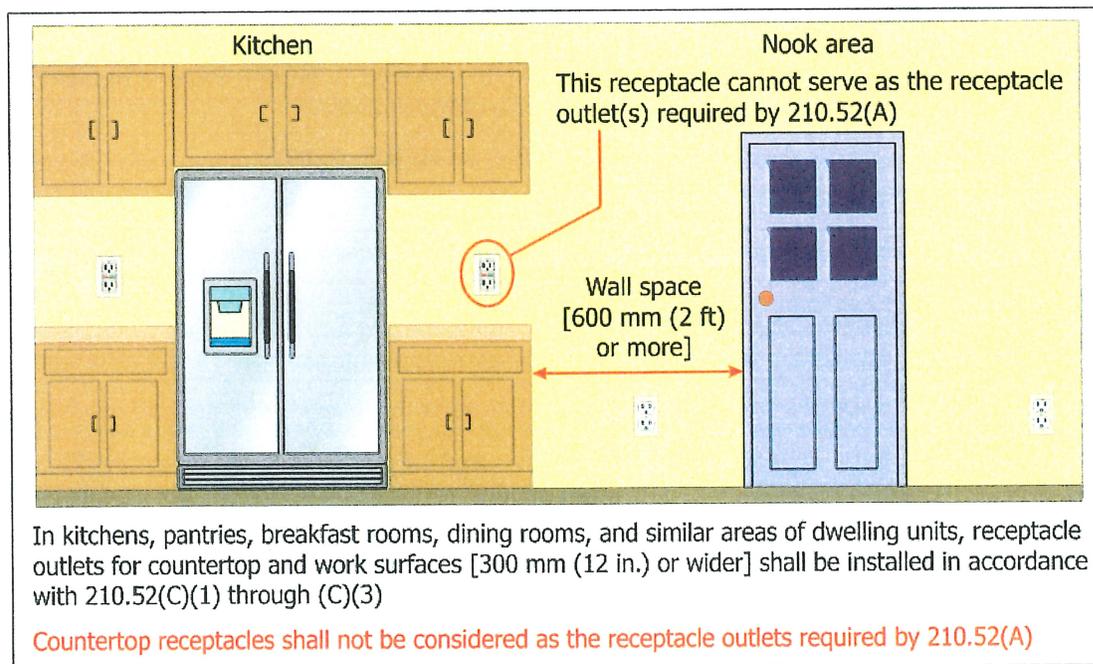
### Change Type: Revision

- AFCI protection has been expanded to patient sleeping rooms in nursing homes and limited-care facilities.
- AFCI technology will provide same protection from arcing faults to the occupants of these rooms that is afforded occupants of conventional dwelling units and guest rooms and guest suites of hotels and motels.

## 210.52(C) Countertops and Work Surfaces

### Change Type: Revision

- Change clarifies that the receptacle outlets installed for countertop or work surfaces [210.52(C)] are not permitted to satisfy the requirement for receptacle outlet placement (wall spacing) as provided in 210.52(A).



## 210.52(C)(2) Island and Peninsular Countertops and Work Surfaces

### Change Type: Revision

- Revision creates two separate List Items for wall space, and island and peninsular countertops and work surfaces.
- For island and peninsular countertop and work surfaces, the horizontal measurement was changed to a square foot calculation to determine the number of receptacles required.

At least one receptacle outlet shall be provided for the **first 0.84 m<sup>2</sup> (9 ft<sup>2</sup>), or fraction thereof**, of the countertop or work surface  
 A receptacle outlet shall be provided for **every additional 1.7 m<sup>2</sup> (18 ft<sup>2</sup>), or fraction thereof**, of the countertop or work surface

7 ft by 4 ft = 28 ft<sup>2</sup>  
 28 ft<sup>2</sup> - 9 ft<sup>2</sup> = 19 ft<sup>2</sup>

At least one receptacle outlet shall be located within **600 mm (2 ft)** of the outer end of a peninsular countertop or work surface

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At least one receptacle outlet shall be provided for the **first 0.84 m<sup>2</sup> (9 ft<sup>2</sup>), or fraction thereof**, of the countertop or work surface  
 A receptacle outlet shall be provided for **every additional 1.7 m<sup>2</sup> (18 ft<sup>2</sup>), or fraction thereof**, of the countertop or work surface

7 ft by 3 ft = 21 ft<sup>2</sup>  
 21 ft<sup>2</sup> - 9 ft<sup>2</sup> = 12 ft<sup>2</sup>

At least one receptacle outlet shall be located within **600 mm (2 ft)** of the outer end of a peninsular countertop or work surface

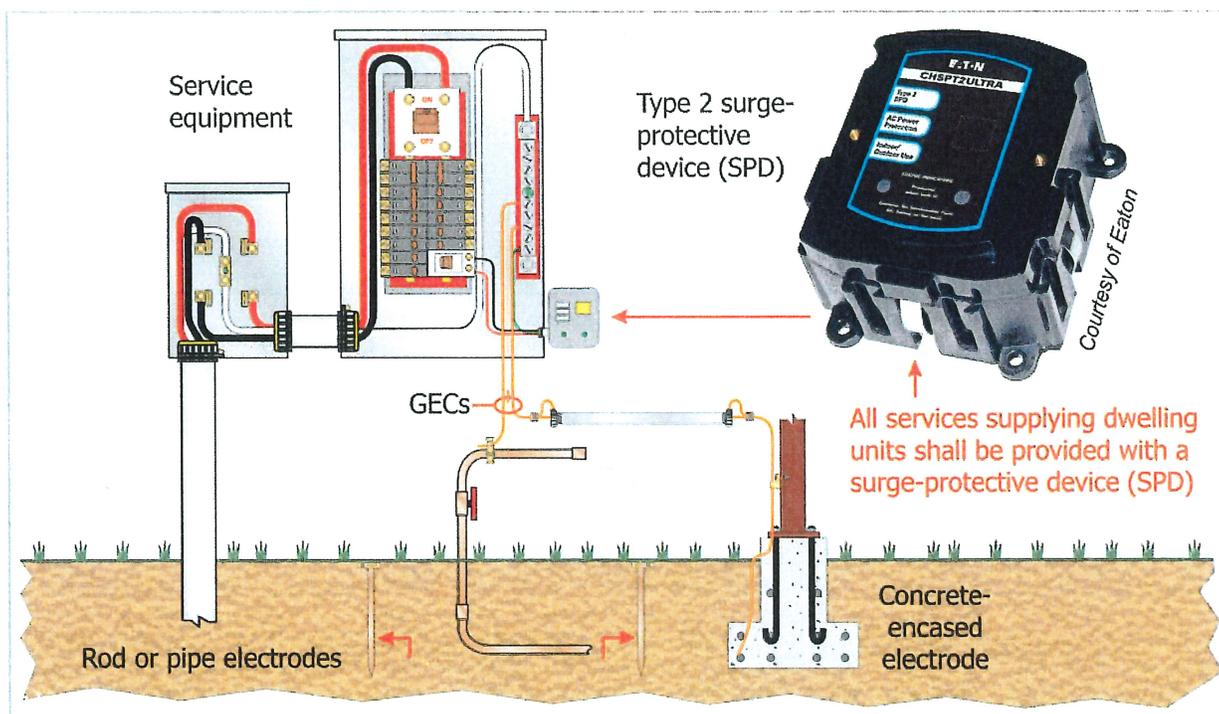
A peninsular countertop is to be measured from the connected perpendicular wall



## 230.67 Surge Protection for Dwelling Units

### Change Type: New

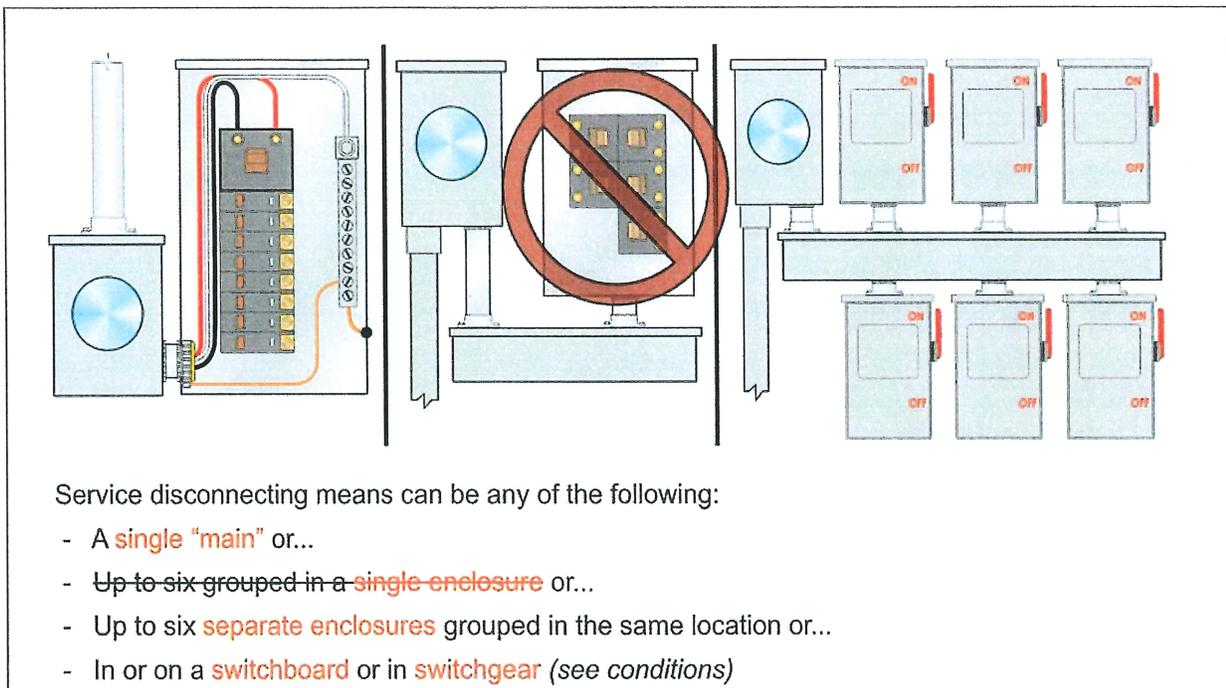
- All dwelling unit services are now required to be provided with surge-protection.
- The surge protection device (SPD) must be an integral part of the service equipment or located immediately adjacent to the service equipment unless it is supplied at each next level distribution equipment downstream toward the load.
- This SPD is required to be either a Type 1 or Type 2 SPD.



## 230.71(A) and (B) Maximum Number of Disconnects

### Change Type: Revision

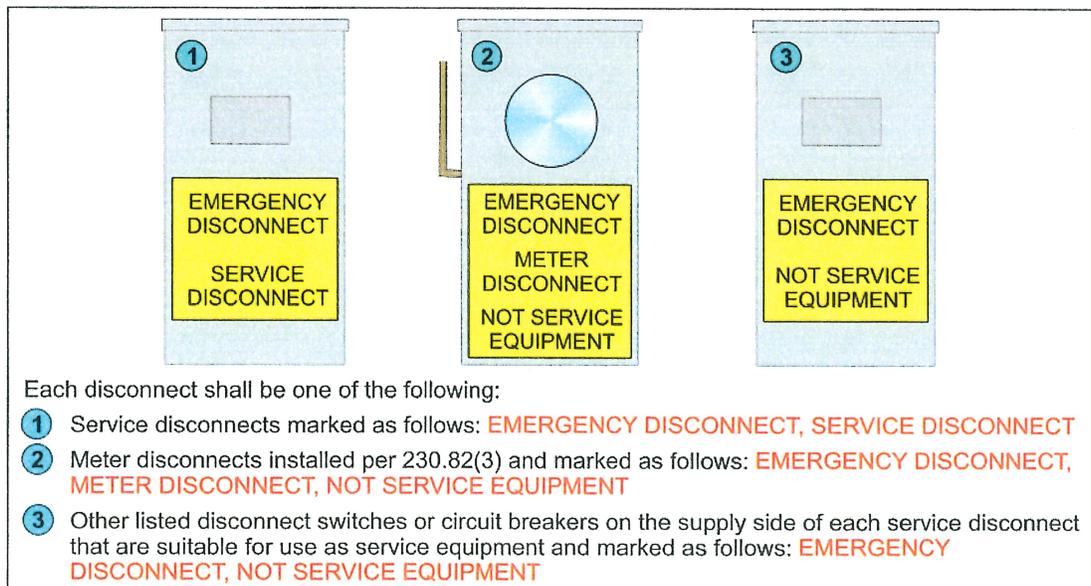
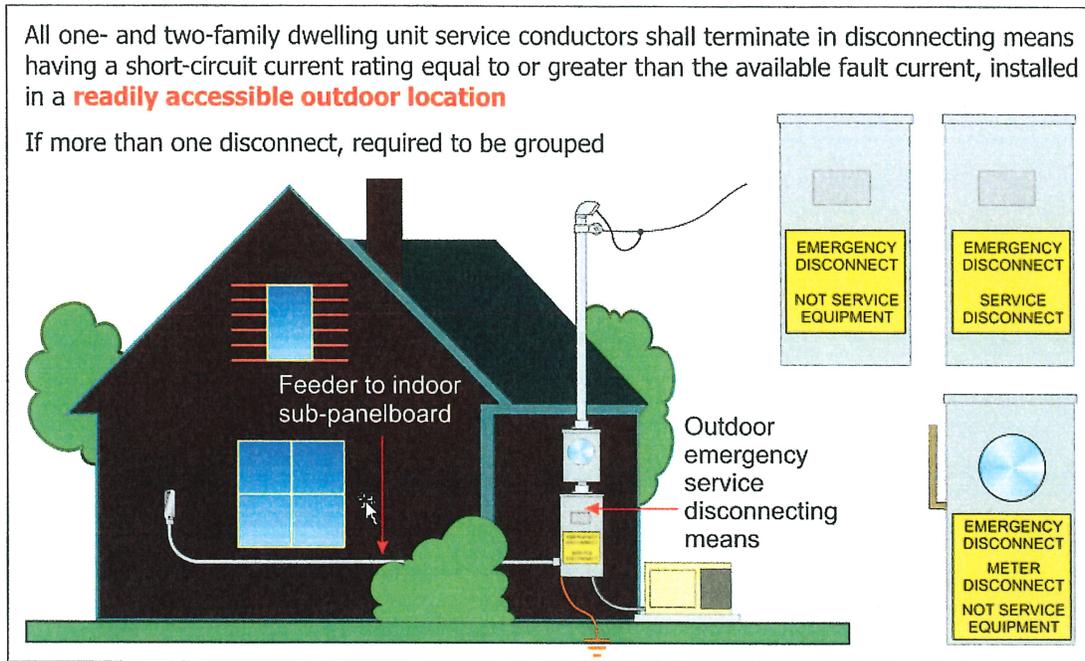
- This revision eliminates more than one service disconnecting means in the same panelboard or other enclosure.
- The six service disconnect rule for services remains; however, the permission for up to six service disconnects is modified to require installation in separate enclosures only.



## 230.85 Exterior Emergency Disconnect(s) for Dwelling Units

**Change Type:** New

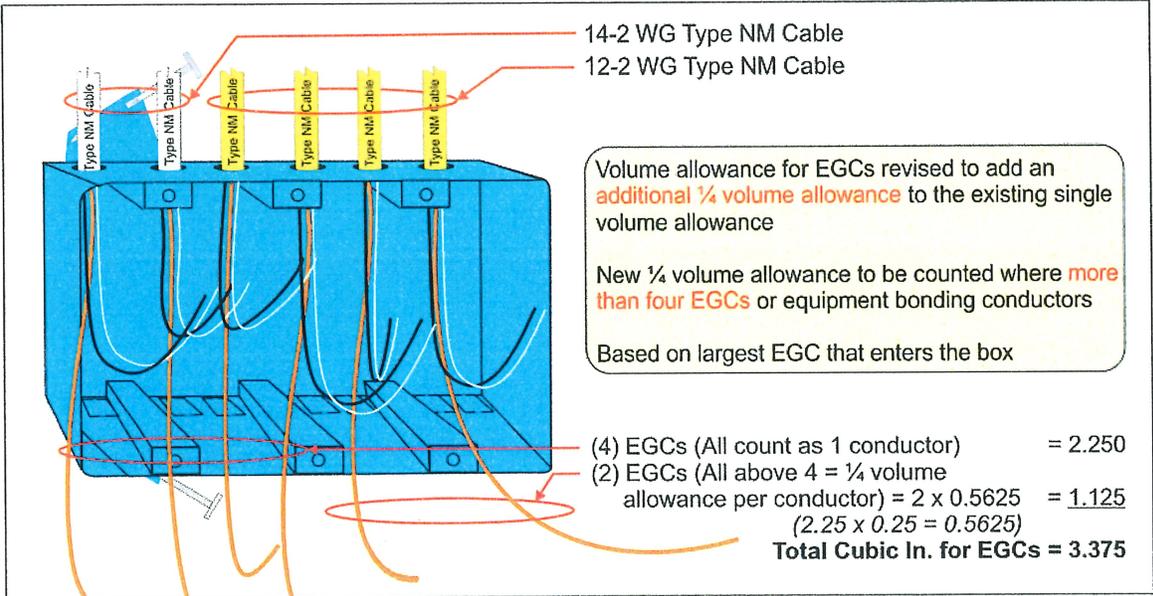
- A new requirement is added to require an emergency disconnect at a readily accessible outdoor location for dwelling units.



### 314.16(B)(5) Box Fill Calculations – EGC Conductor Fill

**Change Type:** Revision

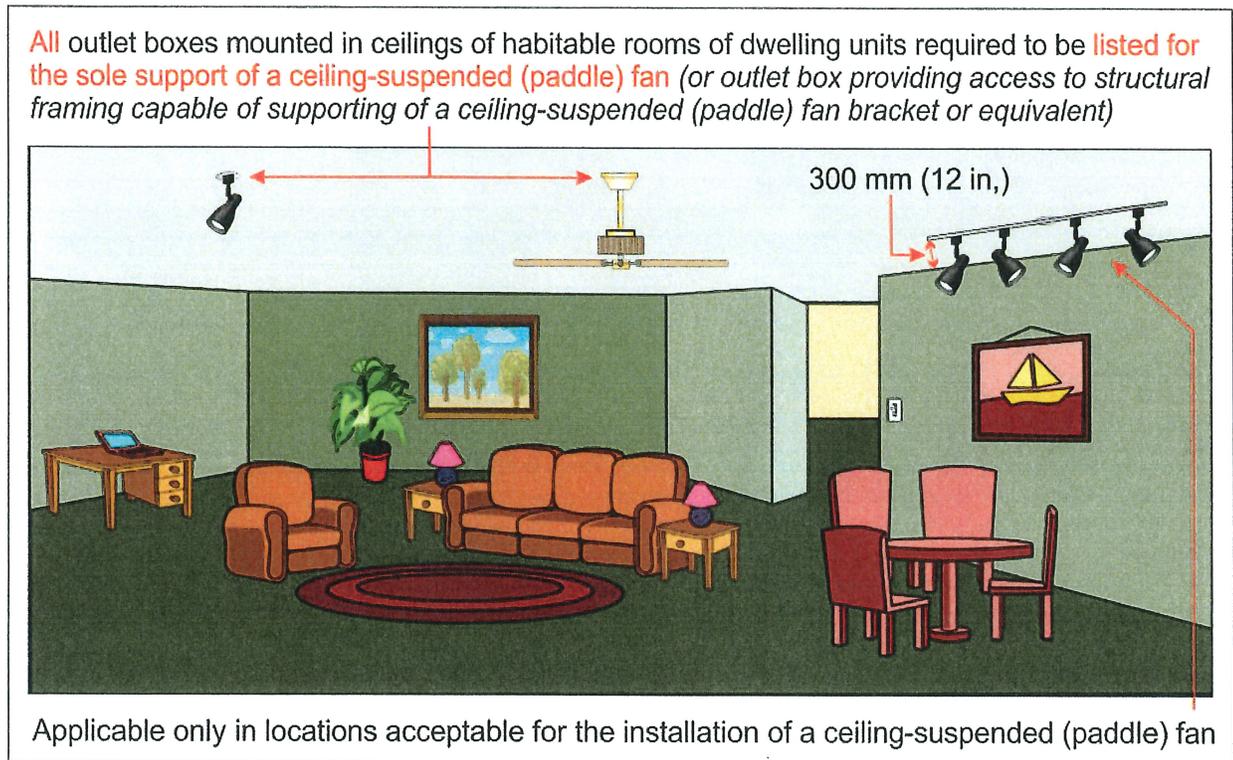
- An additional ¼ volume allowance is now required to be added to the existing single conductor volume allowance based on the largest equipment grounding conductor or equipment bonding jumper entering the box.
- New ¼ volume allowance to be counted in installations with more than four EGCs or equipment bonding conductors.



### 314.27(C) Boxes at Ceiling-Suspended (Paddle) Fan Outlets

**Change Type:** Revision

- This revision will now generally require all outlet boxes mounted in a location acceptable for the installation of a ceiling-suspended (paddle) fan in the ceilings of habitable rooms of dwelling units to be listed for the sole support of ceiling-suspended (paddle) fan.



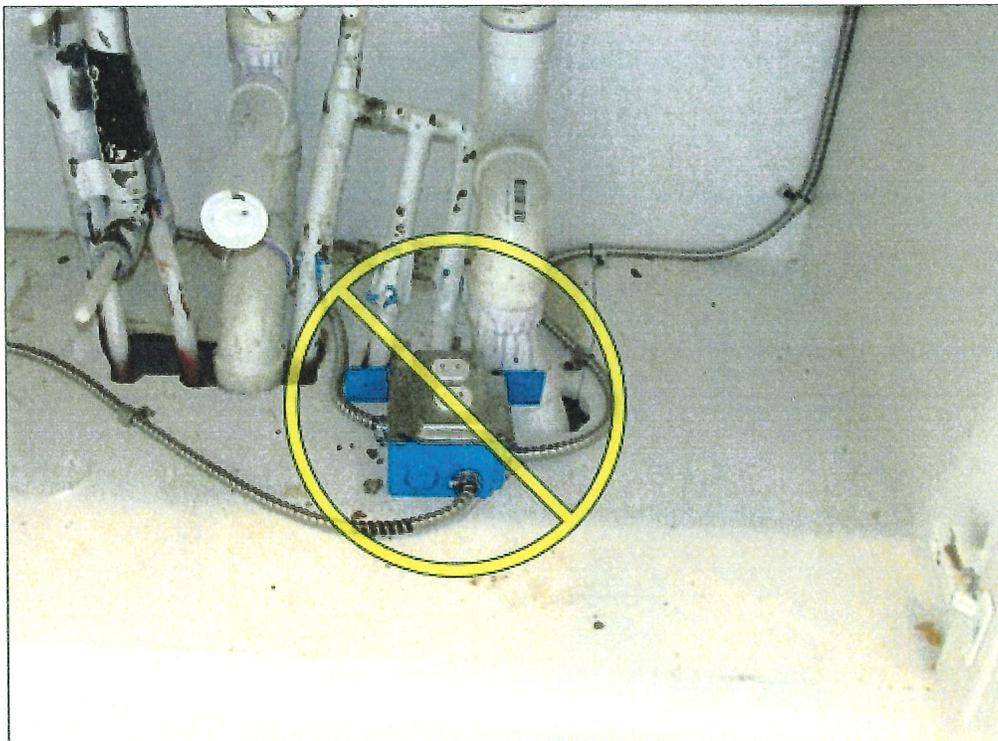
**Note:** In the picture above, an outlet listed for the sole support of a ceiling-suspended (paddle) fan or an outlet box complying with the applicable requirements of 314.27 and providing access to structural framing capable of supporting of a ceiling-suspended (paddle) fan bracket or equivalent must be installed at the single spotlight and fan locations, but not at the track lighting that is within 12" of the wall.



## 406.5(G)(2) Receptacle Mounting Under Sinks

### Change Type: New

- Receptacle outlets are now **prohibited** from being installed in the area **beneath a sink** in the **face-up position**
- Receptacle outlets have been prohibited from being installed in the face-up position in or on **countertop surfaces or work surfaces** since the **2002 NEC (dwelling units)** and all countertops and work surfaces since the **2014 NEC**
- It's not uncommon to see plumbing pipes connecting to a sink (supply and drain) leaking from time-to-time under a sink area such as a kitchen sink
- A receptacle installed face-up under the sink is subject to water entering the **polarized slots of the receptacle** creating a hazardous condition
- New language will help mitigate a **potential hazard**

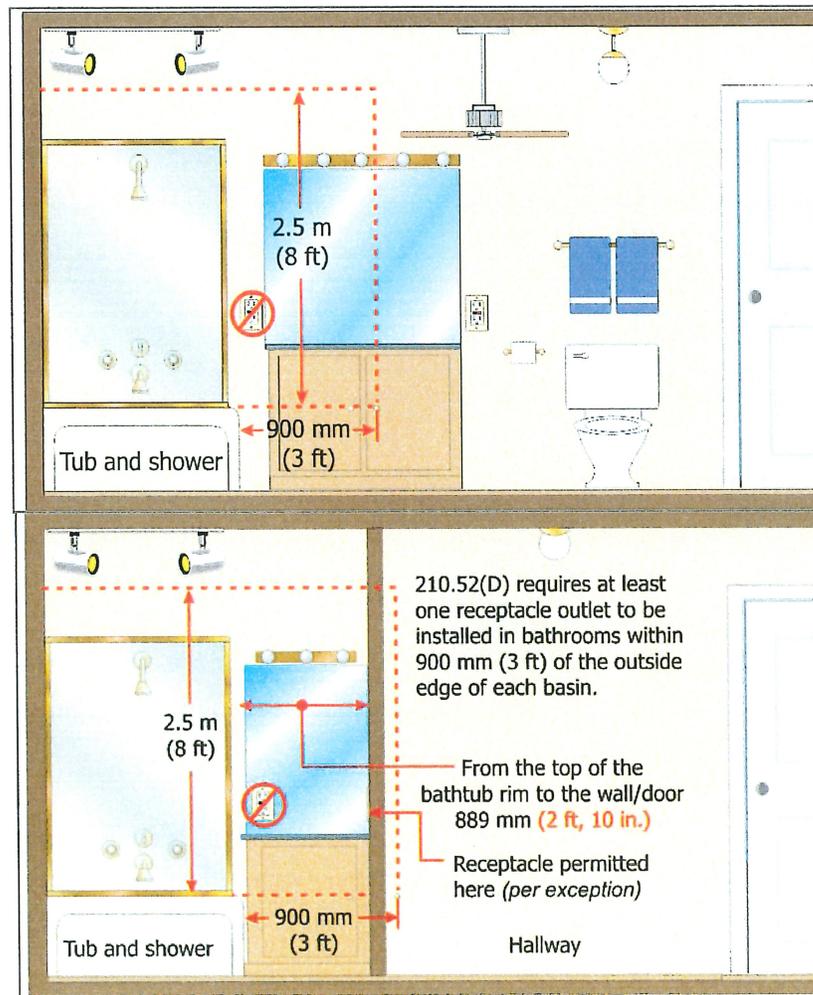


## 406.9(C) Bathtub and Shower Space

Change Type: New/Revision

- Receptacles are now prohibited from being installed within a zone measured **3 ft. horizontally and 8 ft. vertically from the top of the bathtub rim or shower stall threshold**. This zone is all-encompassing and includes the space directly over the tub or shower stall.
- In bathrooms with dimensions less than the required zone, receptacle(s) are permitted to be installed opposite the bathtub rim or shower stall threshold on the farthest wall within the room. (**Exception 1 – second illustration below**)

**Note:** In dwelling units, **Exception 2** (added via TIA 20-15 –Effective 12/28/2021) provides options for a single receptacle for “an electronic toilet or personal hygiene device such as an electronic bidet seat”. (Not shown in illustrations)



## 406.12 Tamper Resistant Receptacles

**Change Type:** New/Revision

- Requirements for tamper-resistant (TR) receptacles were expanded to attached and detached garages and accessory buildings of dwelling units.
- Common areas of multifamily dwelling units and hotels and motels are included as well.
- New List Item (8) was added for assisted living facilities.

TR receptacles requirements or clarification was expanded to the following areas:



**Attached and detached garages** and **accessory buildings** to dwelling units

**Common areas of multifamily dwellings** and **common areas of guest rooms and guest suites of hotels and motels**

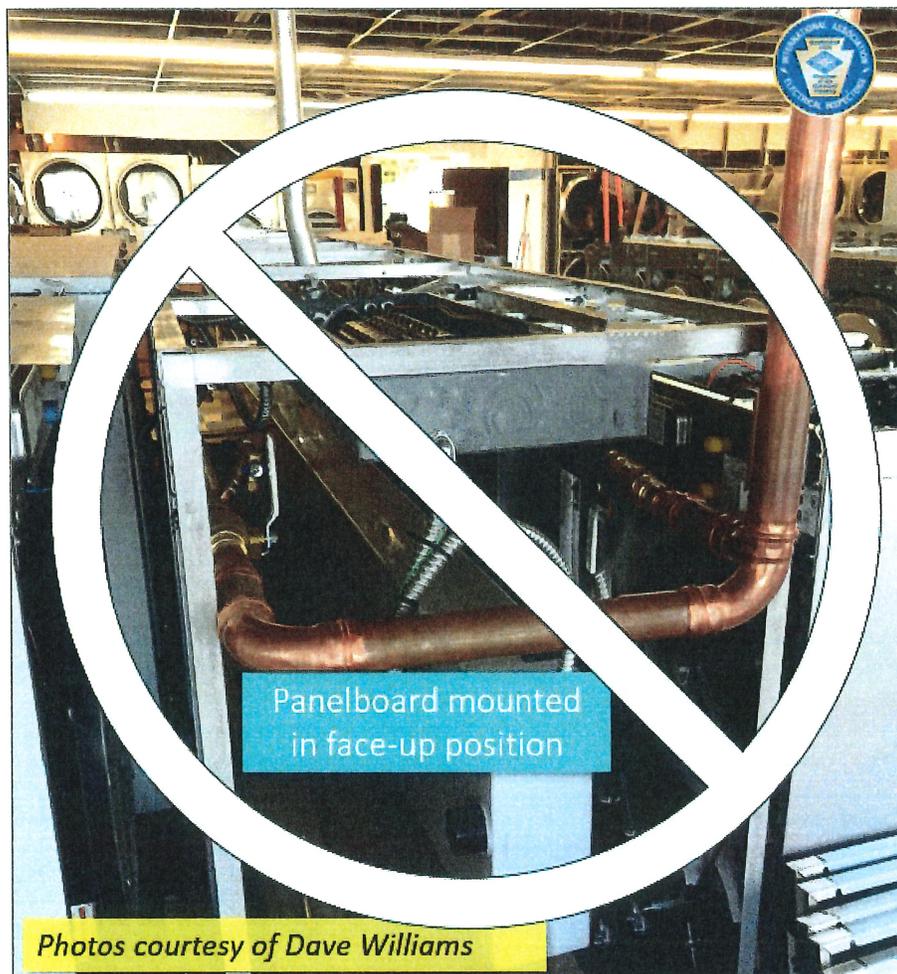
**Assisted living facilities** as small children can be present in these facilities as well



## 408.43 Panelboard Orientation

### Change Type: New

- New 408.43 will now prohibit a panelboard from being mounted in the face-up position.

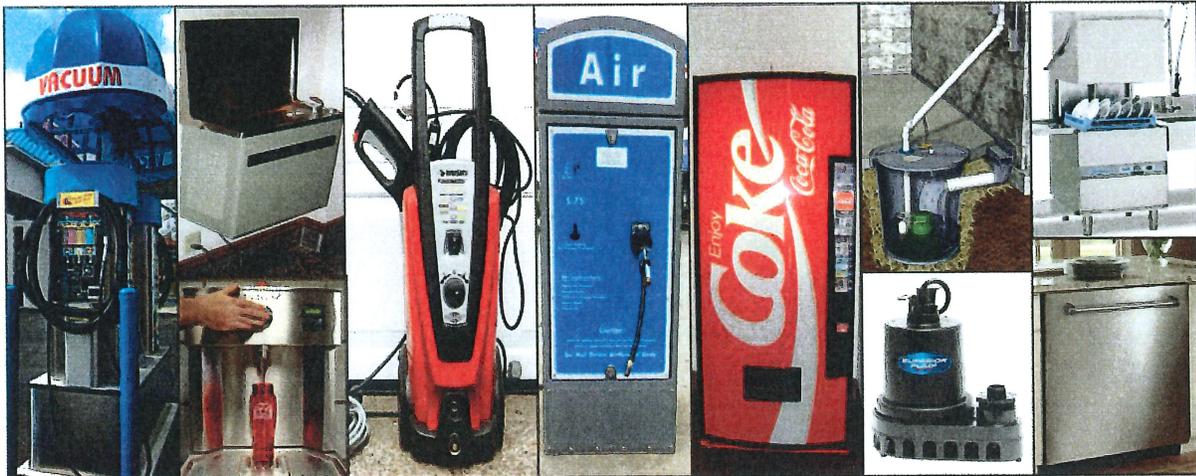


## 422.5(A) GFCI Protection for Appliances

**Change Type:** New/Revision

- The “provided for public use” condition has been removed from GFCI requirements for both automotive vacuum machines and tire inflation machines.
- Sump pumps has been added to the list of appliances requiring GFCI protection.
- Bottle fill stations was added to GFCI requirements for drinking water coolers.
- GFCI requirements for dishwashers moved from 210.8(D) to 422.5(A)(7).

GFCI requirements for Appliances (*150 volts or less to ground and 60 amperes or less, single- or 3-phase*) shall be provided with **Class A** GFCI protection for personnel (*Multiple GFCI devices permitted but not be required*)



(1) Automotive vacuum machines ~~provided for the public~~; (2) Drinking water coolers and bottle fill stations; (3) ~~Cord-and-plug-connected~~ high-pressure spray washing machines; (4) Tire inflation machines ~~provided for the public~~; (5) Vending machines; (6) Sump pumps; (7) Dishwashers

## 445.18(D) Emergency Shutdown Device at Dwelling Units

Change Type: New

- An **outdoor emergency generator shutdown device** is required for generators installed at one- and two-family dwelling units (other than cord-and-plug-connected generators).

### 445.18 Disconnecting Means and Emergency Shutdown of Prime Mover.

(A) Disconnecting Means.

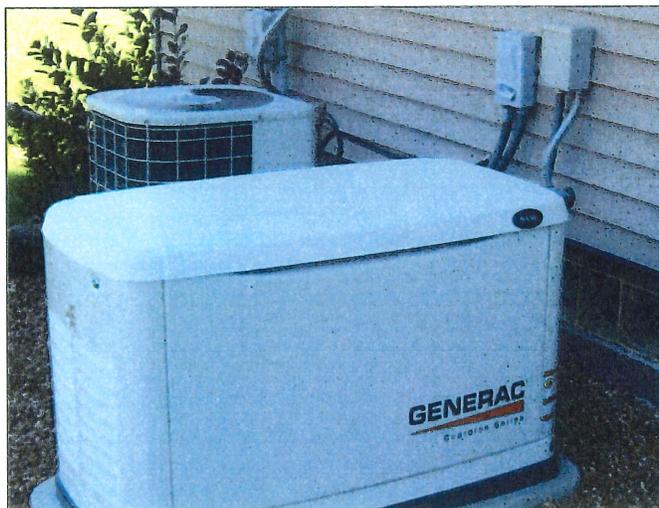
(B) Emergency Shutdown of Prime Mover.

(C) Remote Emergency Shutdown.

(D) Emergency Shutdown in One- and Two-Family Dwelling Units. For other than cord-and-plug-connected portable generators, an emergency shutdown device shall be located outside the dwelling unit at a readily accessible location.

~~(C)~~ (E) Generators Installed in Parallel.

(see 2020 NEC for complete text.)

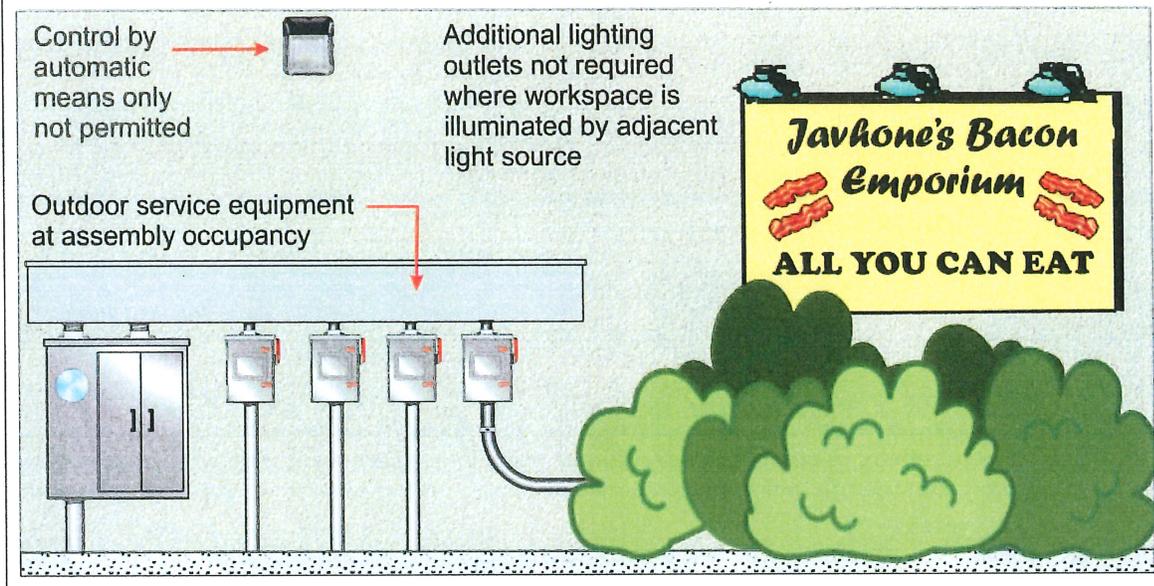


## 518.6 Outdoor Illumination – Assembly Occupancies

Change Type: New

- A new section was added to require outdoor fixed service equipment at assembly occupancies to be provided with proper illumination.

**Illumination required** for working spaces about fixed service equipment, switchboards, switchgear, panelboards, or motor control centers **installed outdoors that serve assembly occupancies**



## 600.5(B) Marking Requirements at Disconnects

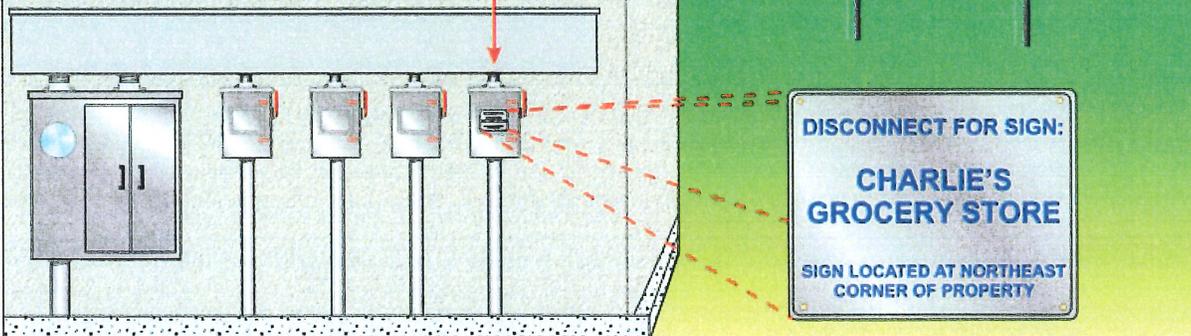
### Change Type: New

- The disconnecting means for a sign, outline lighting system, or controller is now required to be marked to identify the sign, outline lighting system, or controller it controls.
- An exception to this identification rule was also added, which will exempt an external disconnecting means that is mounted on the sign body, sign enclosure, sign pole, or controller.

Disconnecting means for a sign, outline lighting system, or controller is now required to be **marked to identify the sign**, outline lighting system, or controller it controls

**Exception** for external disconnect mounted on the sign body, sign enclosure, sign pole, or controller

Outdoor sign disconnecting means located remote from the sign



The disconnecting means (if located remote from the sign, sign body, or pole) shall be mounted at an **accessible location available to first responders and service personnel** [See 600.6(A)(4)]

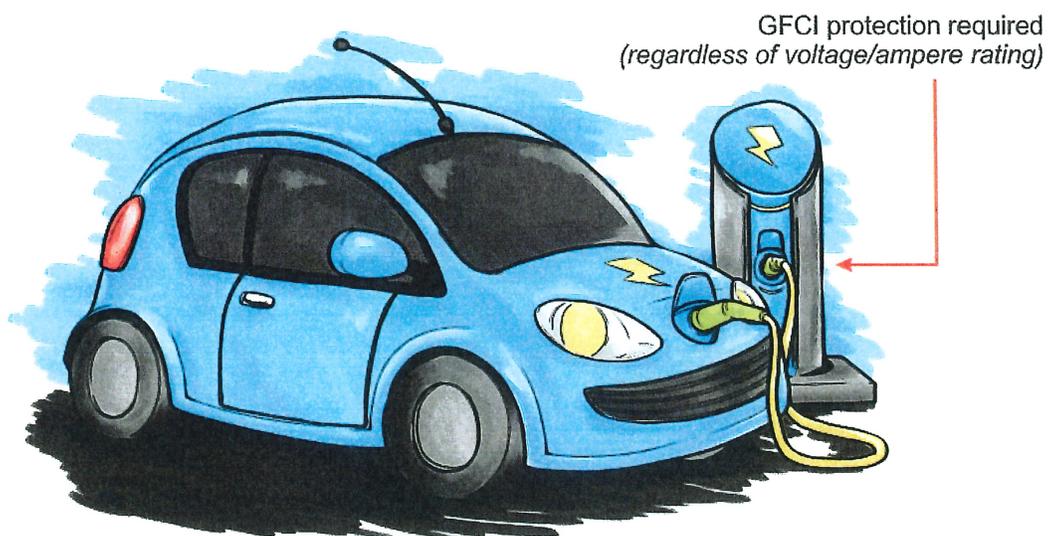


## 625.54 GFCI Protection for EV Charging Equipment

### Change Type: New

- This revision clarifies that all receptacle outlets used for EV charging be provided with GFCI protection for personnel for all cord and plug connected electric vehicle power transfer equipment.

In addition to the requirements in 210.8, ***ALL*** receptacles installed for the connection of electric vehicle charging equipment is required to provide GFCI protection for personnel



## 690.13(A) Photovoltaic System Disconnecting Means

### Change Type: New

- This new requirement calls for any PV disconnect enclosure with a door or hinged cover that exposes live parts when open to be locked or require a tool to open where a disconnecting means of systems above 30 volts are readily accessible to unqualified persons.

PV system disconnecting means shall be installed at a readily accessible location



Where PV disconnecting means (above 30 volts) are readily accessible to unqualified persons, any enclosure door or hinged cover that exposes live parts when open is now required to be locked or require a tool to open



ANY  
QUESTIONS?

