

## **SECTION R319**

### **PROTECTION AGAINST DECAY**

#### **R319.1 Location required.**

In areas subject to decay damage as established by Table R301.2(1), the following locations shall require the use of an approved species and grade of lumber, pressure treated in accordance with AWPA C1, C2, C3, C4, C9, C15, C18, C22, C23, C24, C28, C31, C33, P1, P2 and P3, or decay-resistant heartwood of redwood, black locust, or cedars.

1. Wood joists or the bottom of a wood structural floor when closer than 18 inches (457 mm) or wood girders when closer than 12 inches (305 mm) to the exposed ground in crawl spaces or unexcavated area located within the periphery of the building foundation.
2. All wood framing members that rest on concrete or masonry exterior foundation walls and are less than 8 inches (203 mm) from the exposed ground.
3. Sills and sleepers on a concrete or masonry slab that is in direct contact with the ground unless separated from such slab by an impervious moisture barrier.
4. The ends of wood girders entering exterior masonry or concrete walls having clearances of less than 0.5 inch (12.7 mm) on tops, sides and ends.
5. Wood siding, sheathing and wall framing on the exterior of a building having a clearance of less than 6 inches (152 mm) from the ground.
6. Wood structural members supporting moisture-permeable floors or roofs that are exposed to the weather, such as concrete or masonry slabs, unless separated from such floors or roofs by an impervious moisture barrier.
7. Wood furring strips or other wood framing members attached directly to the interior of exterior masonry walls or concrete walls below grade except where an approved vapor retarder is applied between the wall and the furring strips or framing members.

#### **R319.1.1 Ground contact.**

All wood in contact with the ground and that supports permanent structures intended for human occupancy shall be approved pressure preservative treated wood suitable for ground contact use, except untreated wood may be used where entirely below groundwater level or continuously submerged in fresh water.

#### **R319.1.2 Geographical areas.**

Approved naturally durable or pressure preservative treated wood shall be used for those portions of wood members that form the structural supports of buildings, balconies, porches or similar permanent building appurtenances when such members are exposed to the weather without adequate protection from a roof, eave, overhang or other covering that would prevent moisture or water accumulation on the surface or at joints between members. Depending on local experience, such members may include:

1. Horizontal members such as girders, joists and decking.
2. Vertical members such as posts, poles and columns.
3. Both horizontal and vertical members.

#### **R319.1.3 Posts, poles and columns.**

Posts, poles and columns supporting permanent structures that are embedded in concrete in direct contact with the ground or embedded in concrete exposed to the weather shall be approved pressure preservative treated wood suitable for ground contact use.

#### R319.1.4 Wood columns.

Wood columns shall be approved wood of natural decay resistance or approved pressure preservatively treated wood.

Exceptions:

1. Posts or columns which are either exposed to the weather or located in basements or cellars, supported by piers or metal pedestals projecting 1 inch (25.4 mm) above the floor or finished grade and 6 inches (152 mm) above exposed earth, and are separated there from by an approved impervious moisture barrier.
2. Posts or columns in enclosed crawl spaces or unexcavated areas located within the periphery of the building, supported by a concrete pier or metal pedestal at a height greater than 8 inches (203mm) from exposed ground, are separated therefrom by an impervious moisture barrier.

#### R319.2 Quality mark.

Lumber and plywood required to be pressure preservatively treated in accordance with Section R319.1 shall bear the quality mark of an approved inspection agency that maintains continuing supervision, testing and inspection over the quality of the product and that has been approved by an accreditation body that complies with the requirements of the American Lumber Standard Committee treated wood program.

##### R319.2.1 Required information.

The required quality mark on each piece of pressure preservatively treated lumber or plywood shall contain the following information:

1. Identification of the treating plant.
2. Type of preservative.
3. The minimum preservative retention.
4. End use for which the product was treated.
5. Standard to which the product was treated.
6. Identity of the approved inspection agency.
7. The designation "Dry," if applicable.

Exception: Quality marks on lumber less than 1 inch (25.4 mm) nominal thickness, or lumber less than nominal 1 inch by 5 inches (25.4 mm by 127 mm) or 2 inches by 4 inches (51 mm by 102 mm) or lumber 36 inches (914 mm) or less in length shall be applied by stamping the faces of exterior pieces or by end labeling not less than 25 percent of the pieces of a bundled unit.

#### R319.3 Fasteners.

Fasteners for pressure preservative and fire-retardant-treated wood shall be of hot-dipped galvanized steel, stainless steel, silicon bronze or copper.

## **SECTION R320**

### **PROTECTION AGAINST TERMITES**

#### R320.1

Termite protection shall be provided by registered termiticides, including soil applied pesticides, baiting systems, and pesticides applied to wood, or other approved methods of termite protection labeled for use as a preventative treatment to new construction (see Section 202, Registered Termiticide). Upon completion of the application of the termite protective treatment, a certificate of compliance shall be issued to the building

department by the licensed pest control company that contains the following statement: “The building has received a complete treatment for the prevention of subterranean termites. Treatment is in accordance with rules and laws established by the Florida Department of Agriculture and Consumer Services.”

#### R320.1.1

If soil treatment used for subterranean termite prevention, the initial chemical soil treatment inside the foundation perimeter shall be done after all excavation, backfilling and compaction is complete.

#### R320.1.2

If soil treatment is used for subterranean termite prevention, soil area disturbed after initial chemical soil treatment shall be retreated with a chemical soil treatment, including spaces boxed or formed.

#### R320.1.3

If soil treatment is used for subterranean termite prevention, space in concrete floors boxed out or formed for the subsequent installation of plumbing traps, drains or any other purpose shall be created by using plastic or metal permanently placed forms of sufficient depth to eliminate any planned soil disturbance after initial chemical soil treatment.

#### R320.1.4

If soil treatment is used for subterranean termite prevention, chemically treated soil shall be protected with a minimum 6 mil vapor retarder to protect against rainfall dilution. If rainfall occurs before vapor retarder placement, retreatment is required. Any work, including placement of reinforcing steel, done after chemical treatment until the concrete floor is poured, shall be done in such manner as to avoid penetrating or disturbing treated soil.

#### R320.1.5

If soil treatment is used for subterranean termite prevention, concrete overpour or mortar accumulated along the exterior foundation perimeter shall be removed prior to exterior chemical soil treatment, to enhance vertical penetration of the chemicals.

#### R320.1.6

If soil treatment is used for subterranean termite prevention, chemical soil treatments shall also be applied under all exterior concrete or grade within 1 foot (305 mm) of the primary structure sidewalls. Also, a vertical chemical barrier shall be applied promptly after construction is completed, including initial landscaping and irrigation/sprinkler installation. Any soil disturbed after the chemical vertical barrier is applied shall be promptly retreated.

#### R320.1.7

If a registered termiticide formulated and registered as a bait system is used for subterranean termite prevention, Sections R320.1.1 through R320.1.6 do not apply; however, a signed contract assuring the installation, maintenance and monitoring of the baiting system for a minimum of five years from the issue of the certificate of occupancy shall be provided to the building official prior to the pouring of the slab, and the system must be installed prior to final building approval. If the baiting system directions for use require a monitoring phase prior to installation of the pesticide active ingredient, the installation of the monitoring phase components shall be deemed to constitute installation of the system.

#### R320.1.8

If a registered termiticide formulated and registered as a wood treatment is used for subterranean termite prevention, Sections R320.1.1 through R320.1.6 do not apply. Application of the wood treatment termiticide shall be as required by label directions for use, and must be completed prior to final building approval.

#### R320.2 Penetration.

Protective sleeves around metallic piping penetrating concrete slab-on-grade floors shall not be of cellulose-containing materials and, if soil treatment is used for subterranean termite protection, shall receive application of a termiticide in annular space between sleeve and pipe.

#### R320.3 Cleaning.

Cells and cavities in masonry units and air gaps between brick, stone or masonry veneers and the structure shall be cleaned of all nonpreservative treated or nonnaturally durable wood, or other cellulose-containing material prior to concrete placement.

Exception: Inorganic material manufactured for closing cells in foundation concrete masonry unit construction or clean earth fill placed in concrete masonry unit voids below slab level before termite treatment is performed.

#### R320.4 Concrete bearing ledge.

Brick, stone or other veneer shall be supported by a concrete bearing ledge at least equal to the total thickness of the brick, stone or other veneer, which is poured integrally with the concrete foundation. No supplemental concrete foundation pours which will create a hidden cold joint shall be used without supplemental treatment in the foundation unless there is an approved physical barrier. An approved physical barrier shall also be installed from below the wall sill plate or first block course horizontally to embed in a mortar joint. If masonry veneer extends below grade, a termite protective treatment must be applied to the cavity created between the veneer and the foundation, in lieu of a physical barrier.

Exception: Veneer supported by a shelf angle or lintel secured to the foundation sidewall in accordance with ACI 530/ASCE 5/TMS 402, provided at least a 6-inch (152 mm) clear inspection space of the foundation sidewall exterior exist between the veneer and the top of any soil, sod, mulch or other organic landscaping component, deck, apron, porch, walk or any other work immediately adjacent to or adjoining the structure.

#### R320.5 Pressure preservatively treated and naturally resistant wood.

Heartwood of redwood and eastern red cedar shall be considered termite resistant.

Pressure preservatively treated wood and naturally termite-resistant wood shall not be used as a physical barrier unless a barrier can be inspected for any termite shelter tubes around the inside and outside edges and joints of a barrier.

##### R320.5.1 Field treatment.

Field cut ends, notches and drilled holes of pressure preservatively treated wood shall be retreated in the field in accordance with AWP A M4.

#### R320.6 Foam plastic protection.

Extruded and expanded polystyrene, polyisocyanurate and other foam plastics shall not be installed on the exterior face or under interior or exterior foundation walls or slab foundations located below grade. The clearance between foam plastics installed above grade and exposed earth shall be at least 6 inches (152 mm).

Exceptions:

1. Buildings where the structural members of walls, floors, ceilings and roofs are entirely of noncombustible materials or pressure preservative treated wood.
2. When in addition to the requirements of Section R320.1, an approved method of protecting the foam plastic and structure from subterranean termite damage is provided.
3. On the interior side of basement walls.

## **SECTION R309 GARAGES AND CARPORTS**

### **R309.1 Opening protection.**

Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than 13/8 inches (35 mm) in thickness, solid or honeycomb core steel doors not less than 13/8 inches (35 mm) thick, or 20-minute fire-rated doors.

#### **R309.1.1 Duct penetration.**

Ducts in the garage and ducts penetrating the walls or ceilings separating the dwelling from the garage shall be constructed of a minimum No. 26 gage (0.48 mm) sheet steel or other approved material and shall have no openings into the garage.

### **R309.2 Separation required.**

The garage shall be separated from the residence and its attic area by not less than ½-inch (12.7 mm) gypsum board applied to the garage side. Garages beneath habitable rooms shall be separated from all habitable rooms above by not less than 5/8-inch (15.9 mm) Type X gypsum board or equivalent. Where the separation is a floor-ceiling assembly, the structure supporting the separation shall also be protected by not less than ½-inch (12.7 mm) gypsum board or equivalent.

### **R309.3 Floor surface.**

Garage floor surfaces shall be of approved noncombustible material.

The area of floor used for parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway.

### **R309.4 Carports.**

Carports shall be open on at least two sides. Carport floor surfaces shall be of approved noncombustible material. Carports not open on at least two sides shall be considered a garage and shall comply with the provisions of this section for garages. Exception: Asphalt surfaces shall be permitted at ground level in carports.

The area of floor used for parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway.

### **R309.5 Flood hazard areas.**

Reserved.

### **R309.6 Automatic garage door openers.**

Automatic garage door openers, if provided, shall be listed in accordance with UL 325.

### **R311.4 Doors.**

R311.4.1 Exit door required.

Not less than one exit door conforming to this section shall be provided for each dwelling unit. The required exit door shall provide for direct access from the habitable portions of the dwelling to the exterior without requiring travel through a garage. Access to habitable levels not having an exit in accordance with this section shall be by a ramp in accordance with Section R311.6 or a stairway in accordance with Section R311.5.

R311.4.2 Door type and size.

The required exit door shall be a side-hinged door not less than 3 feet (914 mm) in width and 6 feet 8 inches (2032 mm) in height. Other doors shall not be required to comply with these minimum dimensions.

### **R311.4.3 Landings at doors.**

There shall be a floor or landing on each side of each exterior door.

Exception: Where a stairway of two or fewer risers is located on the exterior side of a door, other than the required exit door, a landing is not required for the exterior side of the door.

The floor or landing at the exit door required by Section R311.4.1 shall not be more than 1.5 inches (38 mm) lower than the top of the threshold. The floor or landing at exterior doors other than the exit door required by Section R311.4.1 shall not be required to comply with this requirement but shall have a rise no greater than that permitted in Section R311.5.3.

Exception: The landing at an exterior doorway shall not be more than 7¾ inches (196 mm) below the top of the threshold, provided the door, other than an exterior storm or screen door does not swing over the landing.

The width of each landing shall not be less than the door served. Every landing shall have a minimum dimension of 36 inches (914 mm) measured in the direction of travel.

## **SECTION R310**

### **EMERGENCY ESCAPE AND RESCUE OPENINGS**

R310.1 Emergency escape and rescue required.

Basements with habitable space and every sleeping room shall have at least one openable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, emergency egress and rescue openings shall be required in each sleeping room, but shall not be required in adjoining areas of the basement. Where emergency escape and rescue openings are provided they shall have a sill height of not more than 44 inches (1118 mm) above the floor. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with Section 310.3. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. Emergency escape and rescue openings with a finished sill

height below the adjacent ground elevation shall be provided with a window well in accordance with Section R310.2. The emergency escape and rescue opening shall be permitted to open into a screen enclosure, open to the atmosphere, where a screen door is provided leading away from the residence.

#### R310.1.1 Minimum opening area.

All emergency escape and rescue openings shall have a minimum net clear opening of 5.7 square feet (0.530 m<sup>2</sup>).

Exception: Grade floor openings shall have a minimum net clear opening of 5 square feet (0.465 m<sup>2</sup>).

#### R310.1.2 Minimum opening height.

The minimum net clear opening height shall be 24 inches (610 mm).

#### R310.1.3 Minimum opening width.

The minimum net clear opening width shall be 20 inches (508 mm).

#### R310.1.4 Operational constraints.

Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys or tools.

#### R310.2 Window wells.

The minimum horizontal area of the window well shall be 9 square feet (0.84 m<sup>2</sup>), with a minimum horizontal projection and width of 36 inches (914 mm). The area of the window well shall allow the emergency escape and rescue opening to be fully opened.

Exception: The ladder or steps required by Section R310.2.1 shall be permitted to encroach a maximum of 6 inches (152 mm) into the required dimensions of the window well.

#### R310.2.1 Ladder and steps.

Window wells with a vertical depth greater than 44 inches (1118 mm) shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position. Ladders or steps required by this section shall not be required to comply with Sections R311.5 and R311.6. Ladders or rungs shall have an inside width of at least 12 inches (305 mm), shall project at least 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457 mm) on center vertically for the full height of the window well.

#### R310.3 Bulkhead enclosures.

Bulkhead enclosures shall provide direct access to the basement. The bulkhead enclosure with the door panels in the fully open position shall provide the minimum net clear opening required by Section R310.1.1. Bulkhead enclosures shall also comply with Section R311.5.8.2.

#### R310.4 Bars, grills, covers and screens.

Bars, grills, covers, screens or similar devices are permitted to be placed over emergency escape and rescue openings, bulkhead enclosures, or window wells that serve such openings, provided the minimum net clear opening size complies with Sections R310.1.1 to R310.1.3, and such devices shall be releasable or removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the escape and rescue opening. The temporary installation or closure of storm shutters, panels, and other approved hurricane protection devices shall be permitted on emergency escape and rescue openings

during the threat of a storm. Such devices shall not be required to comply with the operational constraints of Section R310.1.4. While such protection is provided, at least one means of escape from the dwelling or dwelling unit shall be provided. The means of escape shall be within the first floor of the dwelling or dwelling unit and shall not be located within a garage. Occupants in any part of the dwelling or dwelling unit shall be able to access the means of escape without passing through a lockable door not under their control

## **SECTION R322**

### **ACCESSIBILITY**

#### **R322.1 Scope.**

Shall be in accordance with the provisions of Chapter 11 of the Florida Building Code, Building.

#### **R322.1.1**

All new single-family houses, duplexes, triplexes, condominiums and townhouses shall provide at least one bathroom, located with maximum possible privacy, where bathrooms are provided on habitable grade levels, with a door that has a 29-inch (737 mm) clear opening. However, if only a toilet room is provided at grade level, such toilet rooms shall have a clear opening of not less than 29 inches (737 mm).

#### **R311.3 Hallways.**

The minimum width of a hallway shall be not less than 3 feet (914 mm).

#### **R311.5 Stairways.**

##### **R311.5.1 Width.**

Stairways shall not be less than 36 inches (914 mm) in clear width at all points above the permitted handrail height and below the required headroom height. Handrails shall not project more than 4.5 inches (114 mm) on either side of the stairway and the minimum clear width of the stairway at and below the handrail height, including treads and landings, shall not be less than 31.5 inches (787 mm) where a handrail is installed on one side and 27 inches (698 mm) where handrails are provided on both sides.

Exception: The width of spiral stairways shall be in accordance with Section R311.5.8.

##### **R311.5.2 Headroom.**

The minimum headroom in all parts of the stairway shall not be less than 6 feet 8 inches (2036 mm) measured vertically from the sloped plane adjoining the tread nosing or from the floor surface of the landing or platform.

##### **R311.5.3 Stair treads and risers.**

###### **R311.5.3.1 Riser height.**



The maximum riser height shall be  $7\frac{3}{4}$  inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than  $\frac{3}{8}$  inch (9.5 mm).

#### R311.5.3.2 Tread depth.

The minimum tread depth shall be 10 inches (254 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than  $\frac{3}{8}$  inch (9.5 mm). Winder treads shall have a minimum tread depth of 10 inches (254 mm) measured as above at a point 12 inches (305 mm) from the side where the treads are narrower. Winder treads shall have a minimum tread depth of 6 inches (152 mm) at any point. Within any flight of stairs, the greatest winder tread depth at the 12 inch (305 mm) walk line shall not exceed the smallest by more than  $\frac{3}{8}$  inch (9.5 mm).

#### R311.5.3.3 Profile.

The radius of curvature at the leading edge of the tread shall be no greater than  $\frac{9}{16}$  inch (14.3 mm). A nosing not less than  $\frac{3}{4}$  inch (19 mm) but not more than  $\frac{1}{4}$  inch (32 mm) shall be provided on stairways with solid risers. The greatest nosing projection shall not exceed the smallest nosing projection by more than  $\frac{3}{8}$  inch (9.5 mm) between two stories, including the nosing at the level of floors and landings. Beveling of nosing shall not exceed  $\frac{1}{2}$  inch (12.7 mm). Risers shall be vertical or sloped from the underside of the leading edge of the tread above at an angle not more than 30 (0.51 rad) degrees from the vertical. Open risers are permitted, provided that the opening between treads does not permit the passage of a 4-inch diameter (102 mm) sphere.

Exceptions:

1. A nosing is not required where the tread depth is a minimum of 11 inches (279 mm).
2. The opening between adjacent treads is not limited on stairs with a total rise of 30 inches (762 mm) or less.

#### R311.5.4 Landings for stairways.

There shall be a floor or landing at the top and bottom of each stairway.

Exception: A floor or landing is not required at the top of an interior flight of stairs, provided a door does not swing over the stairs.

A flight of stairs shall not have a vertical rise greater than 12 feet (3658 mm) between floor levels or landings.

The width of each landing shall not be less than the stairway served. Every landing shall have a minimum dimension of 36 inches (914 mm) measured in the direction of travel.

#### R311.5.5 Stairway walking surface.

The walking surface of treads and landings of stairways shall be sloped no steeper than one unit vertical in 48 inches horizontal (2-percent slope).

#### R311.5.6 Handrails.

Handrails shall be provided on at least one side of each continuous run of treads or flight with four or more risers.

##### R311.5.6.1 Height.

Handrail height, measured vertically from the sloped plane adjoining the tread nosing, or finish surface of ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

#### R311.5.6.2 Continuity.

Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above lowest riser of the flight. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1½ inch (38 mm) between the wall and the handrails.

Exceptions:

1. Handrails shall be permitted to be interrupted by a newel post at the turn.
2. The use of a volute, turnout, starting easing or starting newel shall be allowed over the lowest tread.

#### R311.5.6.3 Handrail grip size.

All required handrails shall be of one of the following types or provide equivalent graspability.

1. Type I. Handrails with a circular cross section shall have an outside diameter of at least 1¼ inches (32 mm) and not greater than 2 inches (51 mm). If the handrail is not circular it shall have a perimeter dimension of at least 4 inches (102 mm) and not greater than 6¼ inches (160 mm) with a maximum cross section of dimension of 2¼ inches (57 mm).
2. Type II. Handrails with a perimeter greater than 6¼ inches (160 mm) shall provide a graspable finger recess area on both sides of the profile. The finger recess shall begin within a distance of ¾ inch (19 mm) measured vertically from the tallest portion of the profile and achieve a depth of at least 5/16 inch (8 mm) within 7/8 inch (22 mm) below the widest portion of the profile. This required depth shall continue for at least 3/8 inch (10 mm) to a level that is not less than 1¾ inches (45 mm) below the tallest portion of the profile. The minimum width of the handrail above the recess shall be 1¼ inches (32 mm) to a maximum of 2¾ inches (70 mm). Edges shall have a minimum radius of 0.01 inches (0.25 mm).

#### R311.5.7 Illumination.

All stairs shall be provided with illumination in accordance with Section R303.6.

#### R311.5.8 Special stairways.

Circular stairways, spiral stairways, winders and bulkhead enclosure stairways shall comply with all requirements of Section R311.5 except as specified below.

##### R311.5.8.1 Spiral stairways.

Spiral stairways are permitted, provided the minimum width shall be 26 inches (660 mm) with each tread having a 7½-inches (190 mm) minimum tread depth at 12 inches from the narrower edge. All treads shall be identical, and the rise shall be no more than 9½ inches (241 mm). A minimum headroom of 6 feet 6 inches (1982 mm) shall be provided.

##### R311.5.8.2 Bulkhead enclosure stairways.

Stairways serving bulkhead enclosures, not part of the required building egress, providing access from the outside grade level to the basement shall be exempt from the requirements of Sections R311.4.3 and R311.5 where the maximum height from the basement finished floor level to grade adjacent to the stairway does not exceed 8

feet (2438 mm), and the grade level opening to the stairway is covered by a bulkhead enclosure with hinged doors or other approved means.

#### R311.6 Ramps.

##### R311.6.1 Maximum slope.

Ramps shall have a maximum slope of one unit vertical in eight units horizontal (12.5-percent slope).

##### R311.6.2 Landings required.

A minimum 3-foot-by-3-foot (914 mm by 914 mm) landing shall be provided:

1. At the top and bottom of ramps,
2. Where doors open onto ramps,
3. Where ramps change direction.

##### R311.6.3 Handrails required.

Handrails shall be provided on at least one side of all ramps exceeding a slope of one unit vertical in 12 units horizontal (8.33-percent slope).

##### R311.6.3.1 Height.

Handrail height, measured above the finished surface of the ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

##### R311.6.3.2 Handrail grip size.

Handrails on ramps shall comply with Section R311.5.6.3.

##### R311.6.3.3 Continuity.

Handrails where required on ramps shall be continuous for the full length of the ramp.

Handrail ends shall be returned or shall terminate in newel posts or safety terminals.

Handrails adjacent to a wall shall have a space of not less than 1.5 inches (38 mm) between the wall and the handrails.

## **SECTION R312**

### **GUARDS**

#### R312.1 Guards required.

Porches, balconies or raised floor surfaces located more than 30 inches (762 mm) above the floor or grade below shall have guards not less than 36 inches (914 mm) in height. Open sides of stairs with a total rise of more than 30 inches (762 mm) above the floor or grade below shall have guards not less than 34 inches (864 mm) in height measured vertically from the nosing of the treads.

Porches and decks which are enclosed with insect screening shall be provided with guards where the walking surface is located more than 30 inches (762 mm) above the floor or grade below.

#### R312.2 Guard opening limitations.

Required guards on open sides of stairways, raised floor areas, balconies and porches shall have intermediate rails or ornamental closures which do not allow passage of a sphere 4 inches (102mm) or more in diameter.

Exceptions:

1. The triangular openings formed by the riser, tread and bottom rail of a guard at the open side of a stairway are permitted to be of such a size that a sphere 6 inches (152 mm) cannot pass through.

2. Openings for required guards on the sides of stair treads shall not allow a sphere 43/8 inches (107 mm) to pass through.

## **SECTION R313**

### **SMOKE ALARMS**

#### **R313.1 Smoke alarms.**

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 but 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.

When more than one smoke alarm is required to be installed within an individual dwelling unit the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual unit. The alarm shall be clearly audible in all bedrooms over background noise levels with all intervening doors closed.

All smoke alarms shall be listed and installed in accordance with the provisions of this code and the household fire warning equipment provisions of NFPA 72.

#### **R313.1.1 Alterations, repairs and additions.**

When interior alterations, repairs or additions requiring a permit occur, or when one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be provided with smoke alarms located as required for new dwellings; the smoke alarms shall be interconnected and hard wired.

Exceptions:

1. Smoke alarms in existing areas shall not be required to be interconnected and hard wired where the alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space, or basement available which could provide access for hard wiring and interconnection without the removal of interior finishes.
2. Repairs to the exterior surfaces of dwellings are exempt from the requirements of this section.

#### **R313.2 Power source.**

In new construction, the required smoke alarms shall receive their primary power from the building wiring when such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection. Smoke alarms shall be permitted to be battery operated when installed in buildings without commercial power or in buildings that undergo alterations, repairs or additions regulated by Section R313.1.1.

## **HAZARDOUS GLASS LOCATIONS**

#### **R308.3 Human impact loads.**

Individual glazed areas including glass mirrors in hazardous locations such as those indicated as defined in Section R308.4 shall pass the test requirements of CPSC 16 CFR, Part 1201. Glazing shall comply with the CPSC 16 CFR, Part 1201 criteria for Category I or Category II as indicated in Table R308.3.

Exceptions:

1. Polished wired glass for use in fire doors and other fire resistant locations shall comply with ANSI Z97.1.
2. Louvered windows and jalousies shall comply with Section R308.2.

TABLE R308.3

MINIMUM CATEGORY CLASSIFICATION OF GLAZING

EXPOSED SURFACE AREA OF ONE SIDE OF ONE LITE GLAZING IN  
STORM OR COMBINATION DOORS

(Category Class) GLAZING IN  
DOORS

(Category Class) GLAZED PANELS REGULATED BY ITEM 7 OF SECTION  
R308.4

(Category Class) GLAZED PANELS REGULATED BY ITEM 6 OF SECTION  
R308.4

(Category Class) GLAZING IN DOORS AND ENCLOSURES REGULATED BY  
ITEM 5 OF SECTION R308.4

(Category Class) SLIDING GLASS DOORS PATIO TYPE  
(Category Class)

9 sq. ft. or less	I	I	NRa	I	II	II
More than 9 sq. ft	II	II	II	II	II	II

For SI: 1 square foot = 0.0929 m<sup>2</sup>.

aNR means "No Requirement."

R308.4 Hazardous locations.

The following shall be considered specific hazardous locations for the purposes of glazing:

1. Glazing in swinging doors except jalousies.
2. Glazing in fixed and sliding panels of sliding door assemblies and panels in sliding and bifold closet door assemblies.
3. Glazing in storm doors.
4. Glazing in all unframed swinging doors.
5. Glazing in doors and enclosures for hot tubs, whirlpools, saunas, steam rooms, bathtubs and showers. Glazing in any part of a building wall enclosing these compartments where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) measured vertically above any standing or walking surface.
6. Glazing, in an individual fixed or operable panel adjacent to a door where the nearest vertical edge is within a 24-inch (610 mm) arc of the door in a closed position and whose bottom edge is less than 60 inches (1524 mm) above the floor or walking surface.
7. Glazing in an individual fixed or operable panel, other than those locations described in Items 5 and 6 above, that meets all of the following conditions:
  - 7.1. Exposed area of an individual pane greater than 9 square feet (0.836 m<sup>2</sup>).

- 7.2. Bottom edge less than 18 inches (457 mm) above the floor.
- 7.3. Top edge greater than 36 inches (914 mm) above the floor.
- 7.4. One or more walking surfaces within 36 inches (914 mm) horizontally of the glazing.
8. All glazing in railings regardless of an area or height above a walking surface. Included are structural baluster panels and nonstructural in-fill panels.
9. Glazing in walls and fences enclosing indoor and outdoor swimming pools, hot tubs and spas where the bottom edge of the glazing is less than 60 inches (1524 mm) above a walking surface and within 60 inches (1524 mm) horizontally of the water's edge. This shall apply to single glazing and all panes in multiple glazing.
10. Glazing adjacent to stairways, landings and ramps within 36 inches (914 mm) horizontally of a walking surface when the exposed surface of the glass is less than 60 inches (1524 mm) above the plane of the adjacent walking surface.
11. Glazing adjacent to stairways within 60 inches (1524 mm) horizontally of the bottom tread of a stairway in any direction when the exposed surface of the glass is less than 60 inches (1524 mm) above the nose of the tread.

Exception: The following products, materials and uses are exempt from the above hazardous locations:

1. Openings in doors through which a 3-inch (76 mm) sphere is unable to pass.
2. Decorative glass in Items 1, 6 or 7.
3. Glazing in Section R308.4, Item 6, when there is an intervening wall or other permanent barrier between the door and the glazing.
4. Glazing in Section R308.4, Item 6, in walls perpendicular to the plane of the door in a closed position or where access through the door is to a closet or storage area 3 feet (914 mm) or less in depth. Glazing in these applications shall comply with Section R308.4, Item 7.
5. Glazing in Section R308.4, Items 7 and 10, when a protective bar is installed on the accessible side(s) of the glazing 36 inches  $\pm$  2 inches (914  $\pm$  mm 51 mm) above the floor. The bar shall be capable of withstanding a horizontal load of 50 pounds per linear foot (74.5 kg/m) without contacting the glass and be a minimum of 1½ inches (38 mm) in height.
6. Outboard panes in insulating glass units and other multiple glazed panels in Section R308.4, Item 7, when the bottom edge of the glass is 25 feet (7620 mm) or more above grade, a roof, walking surface, or other horizontal [within 45 degrees (0.79 rad) of horizontal] surface adjacent to the glass exterior.
7. Louvered windows and jalousies complying with the requirements of Section R308.2.
8. Mirrors and other glass panels mounted or hung on a surface that provides a continuous backing support.
9. Safety glazing in Section R308.4, Items 10 and 11 is not required where:

9.1. The side of a stairway, landing or ramp has a guardrail or handrail, including balusters or in-fill panels, complying with the provisions of Sections 1012 and 1607.7 of the Florida Building Code, Building; and

9.2. The plane of the glass is greater than 18 inches (457 mm) from the railing.  
R308.5 Site built windows.

Site built windows shall comply with Section 2404 of the Florida Building Code, Building.

### **R807.1 Attic access.**

In buildings with combustible ceiling or roof construction, an attic access opening shall be provided to attic areas that exceed 30 square feet (2.8 m<sup>2</sup>) and have a vertical height of 30 inches (762 mm) or greater.

The rough-framed opening shall not be less than 22 inches by 30 inches (559 mm by 762 mm) and shall be located in a hallway or other readily accessible location. A 30-inch (762 mm) minimum unobstructed

R806.1 Ventilation required.  
Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain. Ventilating openings shall be provided with corrosion-resistant wire mesh, with 1/8 inch (3.2 mm) minimum to 1/4 inch (6.4 mm) maximum openings.

## **SECTION R806**

### **ROOF VENTILATION**

#### **R806.1 Ventilation required.**

Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain. Ventilating openings shall be provided with corrosion-resistant wire mesh, with 1/8 inch (3.2 mm) minimum to 1/4 inch (6.4 mm) maximum openings.

#### **R806.2 Minimum area.**

The total net free ventilating area shall not be less than 1 to 150 of the area of the space ventilated except that the total area is permitted to be reduced to 1 to 300, provided at least 50 percent and not more than 80 percent of the required ventilating area is provided by ventilators located in the upper portion of the space to be ventilated at least 3 feet (914 mm) above eave or cornice vents with the balance of the required ventilation provided by eave or cornice vents. As an alternative, the net free cross-ventilation area may be reduced to 1 to 300 when a vapor barrier having a transmission rate not exceeding 1 perm (57.4 mg/s · m<sup>2</sup> · Pa) is installed on the warm side of the ceiling.

#### **R806.3 Vent clearance.**

Where eave or cornice vents are installed, insulation shall not block the free flow of air. A minimum of a 1-inch (25.4 mm) space shall be provided between the insulation and the roof sheathing at the location of the vent.

## **SECTION R408**

### **UNDER-FLOOR SPACE**

#### **R408.1 Ventilation.**

The under-floor space between the bottom of the floor joists and the earth under any building (except space occupied by a basement or cellar) shall be provided with ventilation openings through foundation walls or exterior walls. The minimum net area of ventilation openings shall not be less than 1 square foot for each 150 square feet (0.67 m<sup>2</sup> for each 100 m<sup>2</sup>) of under-floor space area. One such ventilating opening shall be within 3 feet (914 mm) of each corner of said building.

#### **R408.2 Openings for under-floor ventilation.**

The minimum net area of ventilation openings shall not be less than 1 square foot (0.0929 m<sup>2</sup>) for each 150 square feet (100 m<sup>2</sup>) of under-floor space area. One such ventilating opening shall be within 3 feet (914 mm) of each corner of the building. Ventilation openings shall be covered for their height and width with any of the following materials provided that the least dimension of the covering shall not exceed ¼ inch (6.4 mm):

1. Perforated sheet metal plates not less than 0.070 inch (1.8 mm) thick.
2. Expanded sheet metal plates not less than 0.047 inch (1.2 mm) thick.
3. Cast iron grills or grating.
4. Extruded load-bearing brick vents.
5. Hardware cloth of 0.035 inch (0.89 mm) wire or heavier.
6. Corrosion-resistant wire mesh, with the least dimension being 1/8 inch (3.2 mm).

Exceptions:

1. Where warranted by climatic conditions, ventilation openings to the outdoors are not required if ventilation openings to the interior are provided.
2. The total area of ventilation openings may be reduced to 1/1500 of the under-floor area where the ground surface is treated with an approved vapor retarder material and the required openings are placed so as to provide cross-ventilation of the space. The installation of operable louvers shall not be prohibited.
3. Under-floor spaces used as supply plenums for distribution of heated and cooled air shall comply with the requirements of Section M1601.9.
4. Ventilation openings are not required where continuously operated mechanical ventilation is provided at a rate of 1.0 cfm (10 m<sup>2</sup>) for each 50 square feet (1.02 L/s) of under-floor space floor area and ground surface is covered with an approved vapor retarder material.
5. Ventilation openings are not required when the ground surface is covered with an approved vapor retarder material, the space is supplied with conditioned air and the perimeter walls are insulated to R-5 for North Florida, R-4 for Central Florida and R-0 for South Florida.

#### **R408.3 Access.**



Access shall be provided to all under-floor spaces. Access openings through the floor shall be a minimum of 18 inches by 24 inches (457 mm by 610 mm). Openings through a perimeter wall shall be 16 inches by 24 inches (407 mm by 610 mm). When any portion of the through wall access is below grade, an areaway of not less than 16 inches by 24 inches (407 mm by 610 mm) shall be provided. The bottom of the areaway shall be below the threshold of the access opening. Through wall access openings shall not be located under a door to the residence. See M1305.1.4 for access requirements where mechanical equipment is located under floors.

## **MECHANICAL**

### **Location of HVAC equipment.**

#### **603.1.3 Space provided.**

Sufficient space shall be provided adjacent to all mechanical components located in or forming a part of the air distribution system to assure adequate access for (1) construction and sealing in accordance with the requirements of Section 603.1 of this code; (2) inspection; and (3) cleaning and maintenance. A minimum of 4 inches (102 mm) is considered sufficient space around air handling units.

Exception: Retrofit or replacement units not part of a renovation are exempt from the minimum clearance requirement.

## **SECTION 504**

### **CLOTHES DRYER EXHAUST**

#### **504.1 Installation.**

Clothes dryers shall be exhausted in accordance with the manufacturer's instructions. Dryer exhaust systems shall be independent of all other systems and shall convey the moisture and any products of combustion to the outside of the building.

Exception: This section shall not apply to listed and labeled condensing (ductless) clothes dryers.

#### **504.2 Exhaust penetrations.**

Ducts that exhaust clothes dryers shall not penetrate or be located within any fireblocking, draftstopping or any wall, floor/ceiling or other assembly required by the Florida Building Code, Building to be fire-resistance rated, unless such duct is constructed of galvanized steel or aluminum of the thickness specified in Section 603.3 and the fire-resistance rating is maintained in accordance with the Florida Building Code, Building. Fire dampers, combination fire/smoke dampers and any similar devices that will obstruct the exhaust flow, shall be prohibited in clothes dryer exhaust ducts.

#### **504.3 Cleanout.**

Each vertical riser shall be provided with a means for cleanout. Such means may include the exhaust duct connection to an individual dryer outlet if it is accessible and readily disassembled.

#### **504.4 Exhaust installation.**

Dryer exhaust ducts for clothes dryers shall terminate on the outside of the building and shall be equipped with a backdraft damper. Screens shall not be installed at the duct termination. Ducts shall not be connected or installed with sheet metal screws or other fasteners that will obstruct the exhaust flow. Clothes dryer exhaust ducts shall not be connected to a vent connector, vent or chimney. Clothes dryer exhaust ducts shall not extend into or through ducts or plenums.

#### **504.5 Makeup air.**

Installations exhausting more than 200 cfm (0.09 m<sup>3</sup>/s) shall be provided with makeup air. Where a closet is designed for the installation of a clothes dryer, an opening having an area of not less than 100 square inches (0.0645 m<sup>2</sup>) shall be provided in the closet enclosure.

#### **504.6 Domestic clothes dryer ducts.**

Exhaust ducts for domestic clothes dryers shall have a smooth interior finish and the maximum developed length shall not exceed 25 feet (7620 mm) from the dryer location to the outlet terminal. The maximum length of the duct shall be reduced 2½ feet (762 mm) for each 45-degree (0.79 rad) bend and 5 feet (1524 mm) for each 90-degree (1.6 rad) bend. The exhaust duct shall be a minimum nominal size of 4 inches (102 mm) in diameter. The entire exhaust system shall be supported and secured in place. The male end of the duct at overlapped duct joints shall extend in the direction of airflow. Clothes dryer transition ducts used to connect the appliance to the exhaust duct system shall be limited to single lengths not to exceed 8 feet (2438 mm) in length and shall be listed and labeled for the application. Transition ducts shall not be concealed within construction. Developed duct lengths longer than 25 feet (7620 mm) shall be allowed for specific dryer installations where the dryer manufacturer's installation instructions specify the allowable developed length of an engineered system.

Exception: Where a clothes dryer booster fan is installed and listed and labeled for the application, the maximum length of the exhaust duct, including any transition duct, shall be permitted to be in accordance with the booster fan manufacturer's installation instructions. Where a clothes dryer booster fan is installed and not readily accessible from the room in which the dryer is located, a permanent identifying label shall be placed adjacent to where the exhaust duct enters the wall. The label shall bear the words: "This dryer exhaust system is equipped with a remotely located booster fan."

##### **504.6.1 Maximum length.**

The maximum length of a clothes dryer exhaust duct shall not exceed 25 feet (7620 mm) from the dryer location to the outlet terminal. The maximum length of duct shall be reduced 2½ feet for each 45-degree (0.79 rad) bend and 5 feet (1524 mm) for each 90-degree (1.6 rad) bend. The maximum length of the exhaust duct does not include the transition duct.

Exception: Where the make and model of the clothes dryer to be installed is known and the manufacturer's installation instructions for such dryer are provided to the code official, the maximum length of the exhaust duct, including any transition duct,

shall be permitted to be in accordance with the dryer manufacturer's installation instructions.

**504.6.2 Rough-in required.**

Where a compartment or space for a domestic clothes dryer is provided, an exhaust duct system shall be installed in accordance with Sections 504.6 and 504.6.1.

**504.7 Commercial clothes dryers.**

The installation of dryer exhaust ducts serving Type 2 clothes dryers shall comply with the appliance manufacturer's installation instructions. Exhaust fan motors installed in exhaust systems shall be located outside of the airstream. In multiple installations, the fan shall operate continuously or be interlocked to operate when any individual unit is operating. Ducts shall have a minimum clearance of 6 inches (152 mm) to combustible materials. Clothes dryer transition ducts used to connect the appliance to the exhaust duct system shall be limited to single lengths not to exceed 8 feet (2438 mm) in length and shall be listed and labeled for the application. Transition ducts shall not be concealed within construction.

**BATHROOM EXHAUST**

**R303.3 Bathrooms.**

Bathrooms, water closet compartments and other similar rooms shall be provided with aggregate glazing area in windows of not less than 3 square feet (0.279 m<sup>2</sup>), one-half of which must be openable.

**Exception:** The glazed areas shall not be required where artificial light and a mechanical ventilation system are provided. The minimum ventilation rates shall be 50 cfm (23.6 L/s) for intermittent ventilation or 20 cfm (9.4 L/s) for continuous ventilation. Ventilation air from the space shall be exhausted directly to the outside.

**FULEGAS**

**SECTION 303**

**APPLIANCE LOCATION**

**303.1 General.**

Appliances shall be located as required by this section, specific requirements elsewhere in this code and the conditions of the equipment and appliance listing.

**303.2 Hazardous locations.**

Appliances shall not be located in a hazardous location unless listed and approved for the specific installation.

**303.3 Prohibited locations.**

Appliances shall not be located in, or obtain combustion air from, any of the following rooms or spaces:

1. Sleeping rooms.
2. Bathrooms.

3. Toilet rooms.
4. Storage closets.
5. Surgical rooms.

Exceptions:

1. Direct-vent appliances that obtain all combustion air directly from the outdoors.
2. Vented room heaters, wall furnaces, vented decorative appliances and decorative appliances for installation in vented solid fuel-burning fireplaces, provided that the room meets the required volume criteria of Section 304.5.
3. A single wall-mounted unvented room heater equipped with an oxygen depletion safety shutoff system and installed in a bathroom, provided that the input rating does not exceed 6,000 Btu/h (1.76 kW) and the bathroom meets the required volume criteria of Section 304.5.
4. A single wall-mounted unvented room heater equipped with an oxygen depletion safety shutoff system and installed in a bedroom, provided that the input rating does not exceed 10,000 Btu/h (2.93 kW) and the bedroom meets the required volume criteria of Section 304.5.
5. Appliances installed in an enclosure in which all combustion air is taken from the outdoors, in accordance with Section 304.6. Access to such enclosure shall be through a solid weather-stripped door, equipped with an approved self-closing device.

#### **303.4 Protection from physical damage.**

Appliances shall not be installed in a location where subject to physical damage unless protected by approved barriers meeting the requirements of the Florida Fire Prevention Code.

#### **303.5 Indoor locations.**

Furnaces and boilers installed in closets and alcoves shall be listed for such installation.

#### **303.6 Outdoor locations.**

Equipment installed in outdoor locations shall be either listed for outdoor installation or provided with protection from outdoor environmental factors that influence the operability, durability and safety of the equipment.

#### **303.7 Pit locations.**

Appliances installed in pits or excavations shall not come in direct contact with the surrounding soil. The sides of the pit or excavation shall be held back a minimum of 12 inches (305 mm) from the appliance. Where the depth exceeds 12 inches (305 mm) below adjoining grade, the walls of the pit or excavation shall be lined with concrete or masonry, such concrete or masonry shall extend a minimum of 4 inches (102 mm) above adjoining grade and shall have sufficient lateral load-bearing capacity to resist collapse. The appliance shall be protected from flooding in an approved manner.

## **SECTION 304**

### **COMBUSTION, VENTILATION AND DILUTION AIR**

#### **304.1 General.**

Air for combustion, ventilation and dilution of flue gases for gas utilization equipment installed in buildings shall be provided by application of one of the methods prescribed in Sections 304.5 through 304.9. Where the requirements of Section 304.5 are not met,

outdoor air shall be introduced in accordance with one of the methods prescribed in Sections 304.6 through 304.9. Direct-vent appliances, gas appliances of other than natural draft design and vented gas appliances other than Category I shall be provided with combustion, ventilation and dilution air in accordance with the equipment manufacturer's instructions.

**Exception:** Type 1 clothes dryers that are provided with makeup air in accordance with Section 614.5.

#### **304.2 Appliance/equipment location.**

Equipment shall be located so as not to interfere with proper circulation of combustion, ventilation and dilution air.

#### **304.3 Draft hood/regulator location.**

Where used, a draft hood or a barometric draft regulator shall be installed in the same room or enclosure as the equipment served so as to prevent any difference in pressure between the hood or regulator and the combustion air supply.

#### **304.4 Makeup air provisions.**

Makeup air requirements for the operation of exhaust fans, kitchen ventilation systems, clothes dryers and fireplaces shall be considered in determining the adequacy of a space to provide combustion air requirements.

#### **304.5 Indoor combustion air.**

The required volume of indoor air shall be determined in accordance with Section 304.5.1 or 304.5.2, except that where the air infiltration rate is known to be less than 0.40 air changes per hour (ACH), Section 304.5.2 shall be used. The total required volume shall be the sum of the required volume calculated for all appliances located within the space. Rooms communicating directly with the space in which the appliances are installed through openings not furnished with doors, and through combustion air openings sized and located in accordance with Section 304.5.3, are considered to be part of the required volume.

##### **304.5.1 Standard method.**

The minimum required volume shall be 50 cubic feet per 1,000 Btu/h (4.8 m<sup>3</sup>/kW) of the appliance input rating.

##### **304.5.2 Known air-infiltration-rate method.**

Where the air infiltration rate of a structure is known, the minimum required volume shall be determined as follows:

For appliances other than fan-assisted, calculate volume using Equation 3-1.

(Equation 3-1)

For fan-assisted appliances, calculate volume using Equation 3-2.

(Equation 3-2)

where:

$I_{other}$  = All appliances other than fan assisted (input in Btu/h).

$I_{fan}$  = Fan-assisted appliance (input in Btu/h).

ACH = Air change per hour (percent of volume of space exchanged per hour, expressed as a decimal).

For purposes of this calculation, an infiltration rate greater than 0.60 ACH shall not be used in Equations 3-1 and 3-2.

##### **304.5.3 Indoor opening size and location.**

Openings used to connect indoor spaces shall be sized and located in accordance with Sections 304.5.3.1 and 304.5.3.2 (see Figure 304.5.3).

Figure 304.5.3

ALL AIR FROM INSIDE THE BUILDING

(see Section 304.5.3)

**304.5.3.1 Combining spaces on the same story.**

Each opening shall have a minimum free area of 1 square inch per 1,000 Btu/h (2,200 mm<sup>2</sup>/kW) of the total input rating of all gas utilization equipment in the space, but not less than 100 square inches (0.06 m<sup>2</sup>). One opening shall commence within 12 inches (305 mm) of the top and one opening shall commence within 12 inches (305 mm) of the bottom of the enclosure. The minimum dimension of air openings shall be not less than 3 inches (76 mm).

**304.5.3.2 Combining spaces in different stories.**

The volumes of spaces in different stories shall be considered as communicating spaces where such spaces are connected by one or more openings in doors or floors having a total minimum free area of 2 square inches per 1,000 Btu/h (4402 mm<sup>2</sup>/kW) of total input rating of all gas utilization equipment.

**304.6 Outdoor combustion air.**

Outdoor combustion air shall be provided through opening(s) to the outdoors in accordance with Section 304.6.1 or 304.6.2. The minimum dimension of air openings shall be not less than 3 inches (76 mm).

**304.6.1 Two-permanent-openings method.**

Two permanent openings, one commencing within 12 inches (305 mm) of the top and one commencing within 12 inches (305 mm) of the bottom of the enclosure, shall be provided. The openings shall communicate directly, or by ducts, with the outdoors or spaces that freely communicate with the outdoors.

Where directly communicating with the outdoors, or where communicating with the outdoors through vertical ducts, each opening shall have a minimum free area of 1 square inch per 4,000 Btu/h (550 mm<sup>2</sup>/kW) of total input rating of all equipment in the enclosure [see Figures 304.6.1(1) and 304.6.1(2)].

Where communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of not less than 1 square inch per 2,000 Btu/h (1,100 mm<sup>2</sup>/kW) of total input rating of all equipment in the enclosure [see Figure 304.6.1(3)].

Figure 304.6.1(1)

ALL AIR FROM OUTDOORS--INLET AIR  
FROM VENTILATED CRAWL SPACE AND  
OUTLET AIR TO VENTILATED ATTIC

(see Section 304.6.1)

Figure 304.6.1(2)

ALL AIR FROM OUTDOORS THROUGH  
VENTILATED ATTIC

(see Section 304.6.1)

Figure 304.6.1(3)  
ALL AIR FROM OUTDOORS  
(see Section 304.6.1)

**304.6.2 One-permanent-opening method.**

One permanent opening, commencing within 12 inches (305 mm) of the top of the enclosure, shall be provided. The equipment shall have clearances of at least 1 inch (25 mm) from the sides and back and 6 inches (152 mm) from the front of the appliance. The opening shall directly communicate with the outdoors or through a vertical or horizontal duct to the outdoors or spaces that freely communicate with the outdoors (see Figure 304.6.2) and shall have a minimum free area of 1 square inch per 3,000 Btu/h (734 mm<sup>2</sup>/kW) of the total input rating of all equipment located in the enclosure, and not less than the sum of the areas of all vent connectors in the space.

FIGURE 304.6.2  
SINGLE COMBUSTION AIR OPENING,  
ALL AIR FROM THE OUTDOORS  
(see Section 304.6.2)

**304.7 Combination indoor and outdoor combustion air.**

The use of a combination of indoor and outdoor combustion air shall be in accordance with Sections 304.7.1 through 304.7.3.

**304.7.1 Indoor openings.**

Where used, openings connecting the interior spaces shall comply with Section 304.5.3.

**304.7.2 Outdoor opening location.**

Outdoor opening(s) shall be located in accordance with Section 304.6.

**304.7.3 Outdoor opening(s) size.**

The outdoor opening(s) size shall be calculated in accordance with the following:

1. The ratio of interior spaces shall be the available volume of all communicating spaces divided by the required volume.
2. The outdoor size reduction factor shall be one minus the ratio of interior spaces.
3. The minimum size of outdoor opening(s) shall be the full size of outdoor opening(s) calculated in accordance with Section 304.6, multiplied by the reduction factor. The minimum dimension of air openings shall be not less than 3 inches (76 mm).

**304.8 Engineered installations.**

Engineered combustion air installations shall provide an adequate supply of combustion, ventilation and dilution air and shall be approved.

**304.9 Mechanical combustion air supply.**

Where all combustion air is provided by a mechanical air supply system, the combustion air shall be supplied from the outdoors at a rate not less than 0.35 cubic feet per minute per 1,000 Btu/h (0.034 m<sup>3</sup>/min/kW) of total input rating of all appliances located within the space.

**304.9.1 Makeup air.**

Where exhaust fans are installed, makeup air shall be provided to replace the exhausted air.

### **304.9.2 Appliance interlock.**

Each of the appliances served shall be interlocked with the mechanical air supply system to prevent main burner operation when the mechanical air supply system is not in operation.

### **304.9.3 Combined combustion air and ventilation air system.**

Where combustion air is provided by the building's mechanical ventilation system, the system shall provide the specified combustion air rate in addition to the required ventilation air.

### **304.10 Louvers and grilles.**

The required size of openings for combustion, ventilation and dilution air shall be based on the net free area of each opening. Where the free area through a design of louver, grille or screen is known, it shall be used in calculating the size opening required to provide the free area specified. Where the design and free area of louvers and grilles are not known, it shall be assumed that wood louvers will have 25-percent free area and metal louvers and grilles will have 75-percent free area. Screens shall have a mesh size not smaller than ¼ inch. Nonmotorized louvers and grilles shall be fixed in the open position. Motorized louvers shall be interlocked with the equipment so that they are proven to be in the full open position prior to main burner ignition and during main burner operation. Means shall be provided to prevent the main burner from igniting if the louvers fail to open during burner start-up and to shut down the main burner if the louvers close during operation.

### **304.11 Combustion air ducts.**

Combustion air ducts shall comply with all of the following:

1. Ducts shall be of galvanized steel complying with Chapter 6 of the Florida Building Code, Mechanical or of equivalent corrosion-resistant material approved for this application.

Exception: Within dwellings units, unobstructed stud and joist spaces shall not be prohibited from conveying combustion air, provided that not more than one required fireblock is removed.

2. Ducts shall terminate in an unobstructed space allowing free movement of combustion air to the appliances.
3. Ducts shall serve a single enclosure.
4. Ducts shall not serve both upper and lower combustion air openings where both such openings are used. The separation between ducts serving upper and lower combustion air openings shall be maintained to the source of combustion air.
5. Ducts shall not be screened where terminating in an attic space.
6. Horizontal upper combustion air ducts shall not slope downward toward the source of combustion air.
7. The remaining space surrounding a chimney liner, gas vent, special gas vent or plastic piping installed within a masonry, metal or factory-built chimney shall not be used to supply combustion air.

Exception: Direct-vent gas-fired appliances designed for installation in a solid fuel-burning fireplace where installed in accordance with the listing and the manufacturer's instructions.



8. Combustion air intake openings located on the exterior of a building shall have the lowest side of such openings located not less than 12 inches (305 mm) vertically from the adjoining grade level.

**304.12 Protection from fumes and gases.**

Where corrosive or flammable process fumes or gases, other than products of combustion, are present, means for the disposal of such fumes or gases shall be provided. Such fumes or gases include carbon monoxide, hydrogen sulfide, ammonia, chlorine and halogenated hydrocarbons.

In barbershops, beauty shops and other facilities where chemicals that generate corrosive or flammable products, such as aerosol sprays, are routinely used, nondirect-vent-type appliances shall be located in an equipment room separated or partitioned off from other areas with provisions for combustion air and dilution air from the outdoors. Direct-vent appliances shall be installed in accordance with the appliance manufacturer's installation instructions.

**PLUMBING**

**SECTION R307**

**TOILET, BATH AND SHOWER SPACES**

**R307.1 Space required.**

Fixtures shall be spaced as per Figure R307.2.

**R307.2 Bathtub and shower spaces.**

Bathtub and shower floors and walls above bathtubs with installed shower heads and in shower compartments shall be finished with a nonabsorbent surface. Such wall surfaces shall extend to a height of not less than 6 feet (1829 mm) above the floor.

FIGURE R 307.2

MINIMUM FIXTURE CLEARANCES

**ELECTRIC NEC 2002**

**110.26 Spaces About Electrical Equipment.**

Sufficient access and working space shall be provided and maintained about all electric equipment to permit ready and safe operation and maintenance of such equipment.

Enclosures housing electrical apparatus that are controlled by lock and key shall be considered accessible to qualified persons.

Key to understanding 110.26 is the division of requirements for spaces about electrical equipment in two separate and distinct categories: working space and dedicated equipment space. Working space generally applies to the protection of the worker, and dedicated equipment space applies to the space reserved for future access to electrical equipment and to protection of the equipment from intrusion by nonelectrical equipment. The performance requirements for all spaces about electrical equipment are set forth in

the first sentence. Storage of materials that blocks access or prevents safe work practices must be avoided at all times.

**(A) Working Space.** Working space for equipment operating at 600 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A)(1), (2), and (3) or as required or permitted elsewhere in this Code.

The intent of 110.26(A) is to provide enough space for personnel to perform any of the operations listed without jeopardizing worker safety. These operations include examination, adjustment, servicing, and maintenance of equipment. Examples of such equipment include panelboards, switches, circuit breakers, controllers, and controls on heating and air-conditioning equipment. It is important to understand that the word examination, as used in 110.26(A), includes such tasks as checking for the presence of voltage using a portable voltmeter.

Minimum working clearances are not required if the equipment is such that it is not likely to require examination, adjustment, servicing, or maintenance while energized. However, “sufficient” access and working space are still required by the opening paragraph of 110.26.

**(1) Depth of Working Space.** The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a), (b), or (c) are met. Distances shall be measured from the exposed live parts or from the enclosure or opening if the live parts are enclosed.

Table 110.26(A)(1) Working Spaces

Nominal Voltage to Ground Minimum Clear Distance

Condition 1 Condition 2 Condition 3

0–150 900 mm (3 ft) 900 mm (3 ft) 900 mm (3 ft)

151–600 900 mm (3 ft) 1 m (31/2 ft) 1.2 m (4 ft)

Note: Where the conditions are as follows:

**Condition 1** — Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides effectively guarded by suitable wood or other insulating materials. Insulated wire or insulated busbars operating at not over 300 volts to ground shall not be considered live parts.

**Condition 2** — Exposed live parts on one side and grounded parts on the other side. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 — Exposed live parts on both sides of the work space (not guarded as provided in Condition 1) with the operator between.

Included in these clearance requirements is the step-back distance from the face of the equipment. Table 110.26(A)(1) provides requirements for clearances away from the equipment, based on the circuit voltage to ground and whether there are grounded or ungrounded objects in the step-back space or exposed live parts across from each other.

The voltages to ground consist of two groups: 0 to 150 and 151 to 600, inclusive.

Remember, where an ungrounded system is utilized, the voltage to ground is the greatest voltage between the given conductor and any other conductor of the circuit. For example, the voltage to ground for a 480-volt ungrounded delta system is 480 volts. See Exhibit

110.7 for general working clearance requirements for each of the three conditions expressed in Table 110.26(A)(1).

Exhibit 110.7 Distances measured from the live parts if the live parts are exposed or from the enclosure front if the live parts are enclosed. If any assemblies, such as switchboards or motor-control centers, are accessible from the back and expose live parts, the working clearance dimensions would be required at the rear of the equipment, as illustrated. Note that for Condition 3, where there is an enclosure on opposite sides of the working space, the clearance for only one working space is required.

(a) Dead-Front Assemblies. Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

The intent of this section is to point out that work space is required only from the side(s) of the enclosure that requires access. The general rule still applies: Equipment that requires front, rear, or side access for electrical activities described in 110.26(A) must meet the requirements of Table 110.26(A)(1). In many cases, equipment of “dead-front” assemblies requires only front access. For equipment that requires rear access for nonelectrical activity, however, a reduced working space of at least 762 mm (30 in.) must be provided. Exhibit 110.8 shows a reduced working space of 30 in. at the rear of equipment to allow work on nonelectrical parts.

Exhibit 110.8 Example of the 30-in. minimum working space at the rear of equipment to allow work on nonelectrical parts, such as the replacement of an air filter.

(b) Low Voltage. By special permission, smaller working spaces shall be permitted where all uninsulated parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

(c) Existing Buildings. In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

This section permits some relief for installations being upgraded. When dead-front switchboards, panelboards, or motor-control centers are replaced in an existing building, the working clearance allowed is that required by Table 110.26(A)(1), Condition 2. The reduction from a Condition 3 to a Condition 2 clearance is allowed only where a written procedure prohibits facing doors of equipment from being open at the same time and where only authorized and qualified persons service the installation. Exhibit 110.9 illustrates this relief for existing buildings.

Exhibit 110.9 Permitted reduction from a Condition 3 to a Condition 2 clearance according to 110.26(A)(1)(c).

(2) Width of Working Space. The width of the working space in front of the electric equipment shall be the width of the equipment or 750 mm (30 in.), whichever is greater. In all cases, the work space shall permit at least a 90 degree opening of equipment doors or hinged panels.

Regardless of the width of the electrical equipment, the working space cannot be less than 30 in. wide. This allows an individual to have at least shoulder-width space in front of the equipment. This 30-in. measurement can be made from either the left or the right edge of the equipment and can overlap other electrical equipment, provided the other equipment does not extend beyond the clearance required by Table 110.26(A)(1). If the equipment is wider than 30 in., the left-to-right space must be equal to the width of the equipment. See Exhibit 110.10 for an explanation of the 30-in. width requirement.

Exhibit 110.10 The 30 in. wide front working space not required to be directly centered on the electrical equipment if space is sufficient for safe operation and maintenance of such equipment.

Sufficient depth in the working space also must be provided to allow a panel or door to open at least 90 degrees. If doors or hinged panels are wider than 3 ft, more than a 3 ft deep working space must be provided to allow a full 90-degree opening. (See Exhibit 110.11.)

Exhibit 110.11 Equipment doors required to open a full 90 degrees to ensure a safe working space.

(3) Height of Working Space. The work space shall be clear and extend from the grade, floor, or platform to the height required by 110.26(E). Within the height requirements of this section, other equipment that is associated with the electrical installation and is located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.

In addition to requiring a working space to be clear from the floor up to a height of 61/2 ft or to the height of the equipment, whichever is greater, this section permits electrical equipment located above or below other electrical equipment to extend into the “working space” not more than 6 in. This requirement allows the placement of a 12 in. × 12 in. wireway on the wall directly above or below a 6 in. deep panelboard without impinging into the working space or compromising practical working clearances. The requirement continues to prohibit large differences in depth of equipment below or above other equipment that specifically requires working space. Electrical equipment that produces heat or that otherwise requires ventilation also must comply with 110.3(B) and 110.13.

(B) Clear Spaces. Working space required by this section shall not be used for storage. When normally enclosed live parts are exposed for inspection or servicing, the working space, if in a passageway or general open space, shall be suitably guarded.

Section 110.26(B), as well as the rest of 110.26, does not prohibit the placement of panelboards in corridors or passageways. Thus, while the covers of corridor-mounted panelboards are removed for servicing or other work, access to the area around the panelboard should be guarded or limited, to protect unqualified persons using the corridor.

(C) Entrance to Working Space.

(1) Minimum Required. At least one entrance of sufficient area shall be provided to give access to working space about electrical equipment.

(2) Large Equipment. For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to the required working space not less than 610 mm (24 in.) wide and 2.0 m (6 1/2 ft) high at each end of the working space. Where the entrance has a personnel door(s), the door(s) shall open in the direction of egress and be equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure.

For the 2002 Code, a new requirement provides for the installation of panic or push-type hardware on personnel door(s) used for egress from electrical rooms containing large electrical equipment (such as switchboards, panelboards, and the like that are over 6 ft wide and rated 1200 amperes or more).

This new requirement affords safety for workers exposed to energized conductors by allowing an injured worker to safely and quickly exit an electrical room without having to turn knobs or pull doors open.

For a graphical explanation of access and entrance requirements to a working space, see Exhibits 110.12 and 110.13. Notice the unacceptable and hazardous situation shown in Exhibit 110.14.

Exhibit 110.12 Basic Rule, first paragraph. At least one entrance is required to provide access to the working space around electrical equipment [110.26(C)(1)]. The lower installation would not be acceptable for a switchboard over 6 ft wide and rated 1200 amperes or more.

Exhibit 110.13 Basic Rule, second paragraph. For equipment rated 1200 amperes or more and over 6 ft wide, one entrance not less than 24 in. wide and 6 1/2 ft high is required at each end [110.26(C)(2)].

Exhibit 110.14 Unacceptable arrangement of a large switchboard. A person could be trapped behind arcing electrical equipment.

A single entrance to the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or (b) is met.

(a) Unobstructed Exit. Where the location permits a continuous and unobstructed way of exit travel, a single entrance to the working space shall be permitted.

(b) Extra Working Space. Where the depth of the working space is twice that required by 110.26(A)(1), a single entrance shall be permitted. It shall be located so that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

For an explanation of 110.26(C)(2)(a) and (b), see Exhibits 110.15 and 110.16.

Exhibit 110.15 Equipment location allowing a continuous and unobstructed way of exit travel.

Exhibit 110.16 Working space with one entrance. Only one entrance is required if the working space required by 110.26(A) is doubled. See Table 110.26(A)(1) for permitted dimensions for X.

(D) Illumination. Illumination shall be provided for all working spaces about service equipment, switchboards, panelboards, or motor control centers installed indoors. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A)(1), Exception No. 1, for switched receptacles. In electrical equipment rooms, the illumination shall not be controlled by automatic means only.

(E) Headroom. The minimum headroom of working spaces about service equipment, switchboards, panelboards, or motor control centers shall be 2.0 m (6½ ft). Where the electrical equipment exceeds 2.0 m (6½ ft) in height, the minimum headroom shall not be less than the height of the equipment.

Exception: In existing dwelling units, service equipment or panelboards that do not exceed 200 amperes shall be permitted in spaces where the headroom is less than 2.0 m (6½ ft).

(F) Dedicated Equipment Space. All switchboards, panelboards, distribution boards, and motor control centers shall be located in dedicated spaces and protected from damage.

Exception: Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.

(1) Indoor. Indoor installations shall comply with 110.26(F)(1)(a) through (d).

(a) Dedicated Electrical Space. The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Suspended ceilings with removable panels shall be permitted within the 1.8-m (6-ft) zone.

(b) Foreign Systems. The area above the dedicated space required by 110.26(F)(1)(a) shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.

(c) Sprinkler Protection. Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.

(d) Suspended Ceilings. A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.

The dedicated electrical space includes the space defined by extending the footprint of the switchboard or panelboard from the floor to a height of 6 ft above the height of the equipment or to the structural ceiling, whichever is lower. This reserved space permits busways, conduits, raceways, and cables to enter the equipment. The dedicated electrical space must be clear of any piping, ducts, leak protection apparatus, or equipment foreign to the electrical installation. Plumbing, heating, ventilation, and air-conditioning piping, ducts, and equipment must be installed outside the width and depth zone.

Foreign systems installed directly above the dedicated space reserved for electrical equipment must include protective equipment that ensures that occurrences such as leaks, condensation, and even breaks do not damage the electrical equipment located below. Sprinkler protection is permitted for the dedicated spaces as long as it complies with this section. A dropped, suspended, or similar ceiling is permitted to be located directly in the dedicated space, as are building structural members.

The electrical equipment also must be protected from physical damage. Damage can be caused by activities occurring near this equipment, such as material handling by personnel or the operation of a forklift or other mobile equipment. See 110.27(B) for other provisions relating to the protection of electrical equipment.

Exhibits 110.17, 110.18, and 110.19 illustrate the two distinct indoor installation spaces required in 110.26(A) and (F), that is, the working space and the dedicated electrical space.

In Exhibit 110.17, the dedicated electrical space required by 110.26(F) is the space outlined by the width and depth of the equipment (the footprint) and extending from the floor to 6 ft above the equipment or to the structural ceiling (whichever is lower). The dedicated electrical space is reserved for the installation of electrical equipment and for the installation of any conduits, cable trays, and so on, entering or exiting that equipment. The outlined area in front of the electrical equipment in Exhibit 110.17 is the working space required by 110.26(A). Note that sprinkler protection is afforded the entire dedicated electrical space and working space without actually entering either space. Also, note that the exhaust duct is not located in or directly above the dedicated electrical space. Although not specifically required to be located here, this duct location may be a cost-effective solution that avoids the substantial physical protection requirements of 110.26(F)(1)(b).

Exhibit 110.17 The two distinct indoor installation spaces required by 110.26(A) and 110.26(F): the working space and the dedicated electrical space.

Exhibit 110.18 illustrates the working space required in front of the panelboard by 110.26(A). No equipment, electrical or otherwise, is allowed in the working space.

Exhibit 110.18 The working space in front of a panelboard as required by 110.26(A). This illustration supplements the dedicated electrical space shown in Exhibit 110.17. Exhibit 110.19 illustrates the dedicated electrical space required over and under the panelboard by 110.26(F)(1). This space is for the cables, raceways, and so on, that run to and from the panelboard.

Exhibit 110.19 The dedicated electrical space above and below a panelboard as required by 110.26(F)(1).

(2) Outdoor. Outdoor electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance or other equipment shall be located in this zone.

Extreme care should be taken where protection from unauthorized personnel or vehicular traffic is added to existing installations in order to comply with this requirement. Any

excavation or driving of steel into the ground for the placement of fencing, vehicle stops, or bollards should be done only after a thorough investigation of the belowgrade wiring.

### **210.52 Dwelling Unit Receptacle Outlets.**

This section provides requirements for 125-volt, 15- and 20-ampere receptacle outlets. Receptacle outlets required by this section shall be in addition to any receptacle that is part of a luminaire (lighting fixture) or appliance, located within cabinets or cupboards, or located more than 1.7 m (5½ ft) above the floor.

Permanently installed electric baseboard heaters equipped with factory-installed receptacle outlets or outlets provided as a separate assembly by the manufacturer shall be permitted as the required outlet or outlets for the wall space utilized by such permanently installed heaters. Such receptacle outlets shall not be connected to the heater circuits.

FPN: Listed baseboard heaters include instructions that may not permit their installation below receptacle outlets.

The requirements of 210.52 apply to dwelling unit receptacles that are rated 125 volts and 15 or 20 amperes and that are not part of a luminaire or an appliance. These receptacles are normally used to supply lighting and general-purpose electrical equipment and are in addition to the ones that are 5½ ft above the floor and within cupboards and cabinets. According to listing requirements [see 110.3(B)], permanent electric baseboard heaters may not be located beneath wall receptacles. If the receptacle is part of the heater, appliance or lamp cords are less apt to be exposed to the heating elements, as might occur should the cords fall into convactor slots. Many electric baseboard heaters are of the low-density type and are longer than 12 ft. To meet the spacing requirements of 210.52(A)(1), the required receptacle may be located as a part of the heater unit, as shown as Exhibit 210.23.

Exhibit 210.23 Permanent electric baseboard heater equipped with a receptacle outlet to meet the spacing requirements of 210.52(A).

**(A) General Provisions.** In every kitchen, family room, dining room, living room, parlor, library, den, sunroom, bedroom, recreation room, or similar room or area of dwelling units, receptacle outlets shall be installed in accordance with the general provisions specified in 210.52(A)(1) through (A)(3).

**(1) Spacing.** Receptacles shall be installed so that no point measured horizontally along the floor line in any wall space is more than 1.8 m (6 ft) from a receptacle outlet. Receptacles are required to be located so that no point in any wall space is more than 6 ft from a receptacle. This rule intends that an appliance or lamp with a flexible cord attached may be placed anywhere in the room near a wall and be within 6 ft of a receptacle, thus eliminating the need for extension cords. Although not an enforceable requirement, receptacles may be placed equal distances apart where there is no specific room layout for the general use of electrical equipment. Section 210.52(A)(1) does not prohibit a receptacle layout designed for intended utilization equipment or practical room use. For example, receptacles in a living room, family room, or den that are intended to serve home entertainment equipment or home office equipment may be placed in corners, may be grouped, or may be placed in a convenient location. Receptacles that are intended for window-type holiday lighting may be placed under windows. In any event, even if



more receptacles than the minimum are installed in a room, no point in any wall space is permitted to be more than 6 ft from a receptacle.

**(2) Wall Space.** As used in this section, a wall space shall include the following:

- (1) Any space 600 mm (2 ft) or more in width (including space measured around corners) and unbroken along the floor line by doorways, fireplaces, and similar openings
- (2) The space occupied by fixed panels in exterior walls, excluding sliding panels
- (3) The space afforded by fixed room dividers such as freestanding bar-type counters or railings

A wall space is a wall unbroken along the floor line by doorways, fireplaces, archways, and similar openings and may include two or more walls of a room (around corners), as illustrated in Exhibit 210.24.

Fixed room dividers, such as bar-type counters and railings, are to be included in the 6 ft measurement. Fixed panels in exterior walls are counted as regular wall space, and a floor-type receptacle close to the wall can be used to meet the required spacing. Isolated, individual wall spaces 2 ft or more in width are considered usable for the location of a lamp or appliance, and a receptacle outlet is required to be provided.

Exhibit 210.24 Typical room plan view of the location of dwelling unit receptacles meeting the requirements of 210.52(A).

**(3) Floor Receptacles.** Receptacle outlets in floors shall not be counted as part of the required number of receptacle outlets unless located within 450 mm (18 in.) of the wall.

**(B) Small Appliances.**

Section 210.52(B) requires two or more 20-ampere circuits for all receptacle outlets for the small-appliance loads, including refrigeration equipment, in the kitchen, dining room, pantry, and breakfast room of a dwelling unit. The countertop receptacle outlets in kitchens must be supplied by no fewer than two small-appliance branch circuits. These circuits may also supply receptacle outlets in the pantry, dining room, and breakfast room, as well as an electric clock receptacle and electric loads associated with gas-fired appliances, but these circuits are to have no other outlets. See 210.8(A)(6) and (7) for GFCI requirements for receptacles serving countertop surfaces.

No restriction is placed on the number of outlets connected to a general-lighting or small-appliance branch circuit. The minimum number of receptacle outlets in a room is determined by 210.52(A) based on the room perimeter. It may be desirable to provide more than the minimum number of receptacle outlets required, thereby further reducing the need for extension cords.

Exhibit 210.25 illustrates the application of the requirements of 210.52(B)(1), (2), and (3). The small-appliance branch circuits illustrated are not permitted to serve any other outlets, such as might be connected to exhaust hoods or fans, disposals, or dishwashers.

The countertop receptacles are also required to be supplied by these two circuits.

Receptacles installed to serve countertop surfaces are required to be GFCI protected in accordance with 210.8(A)(6). The dining room switched receptacle on a 15-ampere general-purpose branch circuit is permitted according to 210.52(B)(1), Exception No. 1. The refrigerator receptacle supplied by a 15-ampere individual branch circuit (Exhibit 210.25, bottom) is permitted by 210.52(B)(1), Exception No. 2.

Exhibit 210.25 Small-appliance branch circuits as applied to the requirements of 210.52(B)(1), (2), and (3) for all receptacle outlets in the kitchen (including refrigerator), pantry, and dining room.

**(1) Receptacle Outlets Served.** In the kitchen, pantry, breakfast room, dining room, or similar area of a dwelling unit, the two or more 20-ampere small-appliance branch circuits required by 210.11(C)(1) shall serve all receptacle outlets covered by 210.52(A) and (C) and receptacle outlets for refrigeration equipment.

**Exception No. 1:** In addition to the required receptacles specified by 210.52, switched receptacles supplied from a general-purpose branch circuit as defined in 210.70(A)(1), **Exception No. 1**, shall be permitted.

**Exception No. 1** to 210.52(B)(1) permits switched receptacles supplied from general-purpose 15-ampere branch circuits to be located in kitchens, pantries, breakfast rooms, and similar areas. See 210.70(A) and Exhibit 210.25 for details.

**Exception No. 2:** The receptacle outlet for refrigeration equipment shall be permitted to be supplied from an individual branch circuit rated 15 amperes or greater.

**Exception No. 2** to 210.52(B)(1) allows a choice for refrigeration equipment receptacle outlets located in a kitchen or similar area. An individual 15-ampere or larger branch circuit may serve this equipment, or it may be included in the 20-ampere small-appliance branch circuit. Refrigeration equipment is also exempt from the GFCI requirements of 210.8. See Exhibit 210.25 for an illustration.

**(2) No Other Outlets.** The two or more small-appliance branch circuits specified in 210.52(B)(1) shall have no other outlets.

**Exception No. 1:** A receptacle installed solely for the electrical supply to and support of an electric clock in any of the rooms specified in 210.52(B)(1).

**Exception No. 2:** Receptacles installed to provide power for supplemental equipment and lighting on gas-fired ranges, ovens, or counter-mounted cooking units.

**Exception . 2** Noto 210.52(B)(2) allows the small electrical loads associated with gas-fired appliances to be connected to small-appliance branch circuits. See Exhibit 210.25 for an illustration.

**(3) Kitchen Receptacle Requirements.** Receptacles installed in a kitchen to serve countertop surfaces shall be supplied by not fewer than two small-appliance branch circuits, either or both of which shall also be permitted to supply receptacle outlets in the same kitchen and in other rooms specified in 210.52(B)(1). Additional small-appliance branch circuits shall be permitted to supply receptacle outlets in the kitchen and other rooms specified in 210.52(B)(1). No small-appliance branch circuit shall serve more than one kitchen.

**(C) Countertops.** In kitchens and dining rooms of dwelling units, receptacle outlets for counter spaces shall be installed in accordance with 210.52(C)(1) through (5).

**(1) Wall Counter Spaces.** A receptacle outlet shall be installed at each wall counter space that is 300 mm (12 in.) or wider. Receptacle outlets shall be installed so that no point along the wall line is more than 600 mm (24 in.) measured horizontally from a receptacle outlet in that space.

**(2) Island Counter Spaces.** At least one receptacle outlet shall be installed at each island counter space with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater.

**(3) Peninsular Counter Spaces.** At least one receptacle outlet shall be installed at each peninsular counter space with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater. A peninsular countertop is measured from the connecting edge.

**(4) Separate Spaces.** Countertop spaces separated by range tops, refrigerators, or sinks shall be considered as separate countertop spaces in applying the requirements of 210.52(C)(1), (2), and (3).

**(5) Receptacle Outlet Location.** Receptacle outlets shall be located above, but not more than 500 mm (20 in.) above, the countertop. Receptacle outlets rendered not readily accessible by appliances fastened in place, appliance garages, or appliances occupying dedicated space shall not be considered as these required outlets.

Exception: To comply with the conditions specified in (a) or (b), receptacle outlets shall be permitted to be mounted not more than 300 mm (12 in.) below the countertop.

Receptacles mounted below a countertop in accordance with this exception shall not be located where the countertop extends more than 150 mm (6 in.) beyond its support base.

Dwelling unit receptacles that serve countertop spaces in kitchens, dining areas, and similar rooms, as illustrated in Exhibit 210.26, are required to be installed as follows:

(1) In each wall space wider than 12 in. and spaced so that no point along the wall line is more than 24 in. from a receptacle

(2) Not more than 20 in. above the countertop [According to 406.4(E), receptacles cannot be installed in a face-up position. Receptacles installed in a face-up position in a countertop could collect crumbs, liquids, and other debris, resulting in a potential fire or shock hazard.]

(3) At each countertop island and peninsular countertop with a short dimension of at least 12 in. and a long dimension of at least 24 in. (The measurement of a peninsular-type countertop is from the edge connecting to the nonpeninsular counter.)

(4) Accessible for use and not blocked by appliances occupying dedicated space or fastened in place

(5) Fed from two or more of the required 20-ampere small-appliance branch circuits and GFCI protected according to 210.8(A)(6)

For the 2002 Code, the maximum permitted height of a receptacle serving a countertop was revised in 210.52(C)(5) upward from 18 in. to 20 in. as a practical consideration.

Exhibit 210.26 Dwelling unit receptacles serving countertop spaces in a kitchen and installed in accordance with 210.52(C).

(a) Construction for the physically impaired.

(b) On island and peninsular countertops where the countertop is flat across its entire surface (no backsplashes, dividers, etc.) and there are no means to mount a receptacle within 500 mm (20 in.) above the countertop, such as an overhead cabinet.

**(D) Bathrooms.** In dwelling units, at least one wall receptacle outlet shall be installed in bathrooms within 900 mm (3 ft) of the outside edge of each basin. The receptacle outlet shall be located on a wall or partition that is adjacent to the basin or basin countertop.

Section 210.52(D) requires one wall receptacle in each bathroom of a dwelling unit to be installed adjacent (within 36 in.) to the washbasin. This receptacle is required in addition to any receptacle that may be part of any luminaire or medicine cabinet. If there is more than one washbasin, a receptacle outlet is required adjacent to each basin location. If the

basins are in close proximity, one receptacle outlet installed between the two basins might satisfy this requirement. See 410.57(D), which prohibits installation of a receptacle inside bathtub and shower spaces. See Exhibit 210.9 for a sample electrical layout of a bathroom.

Section 210.11(C)(3) requires the receptacle outlets to be supplied from a 20-ampere branch circuit with no other outlets. However, this circuit is permitted to supply the required receptacles in more than one bathroom. If the circuit supplies the required receptacle outlet in only one bathroom, it is allowed to also supply lighting and an exhaust fan within that bathroom. This receptacle is also required to be GFCI protected according to 210.8(A)(1).

**(E) Outdoor Outlets.** For a one-family dwelling and each unit of a two-family dwelling that is at grade level, at least one receptacle outlet accessible at grade level and not more than 2.0 m (6 1/2 ft) above grade shall be installed at the front and back of the dwelling. See 210.8(A)(3).

The rule for one- and two-family dwellings requires two outdoor receptacle outlets for each dwelling unit, as shown in Exhibit 210.27. When installing outdoor receptacles the receptacle faceplate must rest securely on the supporting surface to prevent moisture from entering the enclosure. On uneven surfaces, such as brick, stone, or stucco, it may be necessary to close openings with caulking compound or mastic. See 406.8 for further information on receptacles installed in damp or wet locations.

Exhibit 210.27 Row housing with GFCI-protected receptacles located, as required by 210.52(E), at the front and back of each one-family dwelling.

**(F) Laundry Areas.** In dwelling units, at least one receptacle outlet shall be installed for the laundry.

Exception No. 1: In a dwelling unit that is an apartment or living area in a multifamily building where laundry facilities are provided on the premises and are available to all building occupants, a laundry receptacle shall not be required.

Exception No. 2: In other than one-family dwellings where laundry facilities are not to be installed or permitted, a laundry receptacle shall not be required.

A laundry receptacle outlet(s) is supplied by a 20-ampere branch circuit. This circuit can have no other outlets. See 210.11(C)(2) for further information.

**(G) Basements and Garages.** For a one-family dwelling, at least one receptacle outlet, in addition to any provided for laundry equipment, shall be installed in each basement and in each attached garage, and in each detached garage with electric power. See 210.8(A)(2) and (A)(5). Where a portion of the basement is finished into one or more habitable rooms, each separate unfinished portion shall have a receptacle outlet installed in accordance with this section.

In a one-family dwelling, a receptacle must be installed in the basement (in addition to the laundry receptacle), in each attached garage, and in each detached garage with electric power.

Section 210.8(A)(5) requires receptacles in unfinished basements to be protected by GFCIs. Section 210.8(A)(2) requires receptacles that are installed in garages to be protected by GFCIs. If no electrical power is provided to detached garages, receptacles do not have to be installed.

**(H) Hallways.** In dwelling units, hallways of 3.0 m (10 ft) or more in length shall have at least one receptacle outlet.

As used in this subsection, the hall length shall be considered the length along the centerline of the hall without passing through a doorway.

The requirement in 210.52(H) is intended to minimize strain or damage to cords and receptacles for dwelling unit receptacles. The requirement does not apply to common hallways of hotels, motels, apartment buildings, condominiums, and so on.