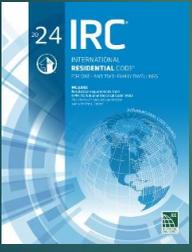


2024 International Residential Code Update and Overview

1



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1

Instructor:

Bill Clayton, CBO



2

- ▶ Over 33 years of Code Administration and enforcement experience
- ▶ Instructor, Consultant, Inspector, Plans Examiner, RCBO
- ▶ ICC/IBC General Committee 2015 cycle
- ▶ ICC/IBC Committee 2009 & 2012 cycle
- ▶ Instructor with CCC & Shums Coda 10+ years
- ▶ C0-Author of 2024 ICC resource book "Fire Stopping, Joint Systems, and Dampers"

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Today's Discussion

3

- ▶ Significant Changes between the 2018 to the 21 and 2024 International Residential Code
- ▶ Chapters 1-10 (Building Provisions)
- ▶ Intent/Impact of the change
- ▶ Use of the code and application of the changes
- ▶ Significant restructuring took place and renumbering some without technical changes.
- ▶ Tables are moved to directly after the pertinent code sections.



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R101.2 Scope

4

- ▶ Exception: The following shall be permitted to be constructed in accordance with this code where provided with an automatic sprinkler system complying with Section P2904:
 - ▶ 1. Live/work units located in townhouses and complying with the requirements of Section 308.5 of the International Building Code.
 - ▶ 2. Owner-occupied lodging houses with five or fewer guestrooms.
 - ▶ 3. A care facility with five or fewer persons receiving custodial care within a dwelling unit.
 - ▶ 4. A care facility with five or fewer persons receiving medical care within a dwelling unit.
 - ▶ 5. A day care facility for five or fewer persons at any time receiving care that are within a single-family dwelling.

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R101.3 Purpose

5



- ▶ The purpose of this code is to establish minimum requirements to provide a reasonable level of safety, health and general welfare through affordability, structural strength, means of egress, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards and to provide a reasonable level of safety to fire fighters and emergency responders during emergency operations.

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R102.6.1 Additions, alterations, change of use or repairs.

6

- ▶ Additions, alterations or repairs to any structure shall conform to the requirements for a new structure without requiring the existing structure to comply with the requirements of this code, unless otherwise stated.
- ▶ Additions, alterations, repairs and relocations shall not cause an existing structure to become less compliant with the provisions of this code than the existing building or structure was prior to the addition, alteration or repair.



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R102.6.1 Additions, alterations or repairs.

7

- ▶ Where additions, alterations or changes of use to an existing structure result in a use, occupancy, height or means of egress outside the scope of this code, the building shall comply with the International Existing Building Code.



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7

R104.2 Duties of BO

8

- ▶ R104.2 Determination of compliance.
- ▶ The building official shall have the authority to render interpretations of this code and to adopt policies and procedures in order to clarify the application of this code's provisions. Such interpretations, policies and procedures:
 - ▶ 1. Shall be in compliance with the intent and purpose of this code.
 - ▶ 2. Shall not have the effect of waiving requirements specifically provided for in this code.

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R104.2.2.4 Equivalency Criteria

9

- ▶ An alternative material, design or method of construction shall, for the purpose intended, be not less than the equivalent of that prescribed in this code with respect to all the following, as applicable:
 - ▶ 1. Quality.
 - ▶ 2. Strength.
 - ▶ 3. Effectiveness.
 - ▶ 4. Durability.
 - ▶ 5. Safety, other than fire safety.
 - ▶ 6. Fire safety.

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R104.2.2.6.1 Evaluation Reports

10

- ▶ Evaluation reports shall be issued by an approved agency and use of the evaluation report shall require approval by the building official for the installation. The alternate material, design or method of construction and product evaluated shall be within the scope of the building official's recognition of the approved agency. Criteria used for the evaluation shall be identified within the report and, where required, provided to the building official.



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R104.7. Records and Approvals

11

- ▶ R104.7 Official records.
- ▶ The building official shall keep official records as required in Sections R104.7.1 through R104.7.5. Such official records shall be retained for not less than 5 years or for as long as the building or structure to which such records relate remains in existence, unless otherwise provided by other regulations.
- ▶ R104.7.1 Approvals.
- ▶ A record of approvals shall be maintained by the building official and shall be available for public inspection during business hours in accordance with applicable laws.

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11

R105.2 exempt from permit

12

- ▶ Decks not exceeding 200 square feet (18.58 m²) in area, that are not more than 30 inches (762 mm) above grade at any point, are not attached to a dwelling or townhouse and do not serve the exit door required by Section R318.4.

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Approved Source

16

APPROVED SOURCE. An independent person, firm or corporation, approved by the building official, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses.

For the definition applicable in Chapter 11, see Section N1101.6.

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16

BIPV

17

- ▶ **BUILDING-INTEGRATED PHOTOVOLTAIC (BIPV) ROOF COVERING.** A BIPV system that also functions as a roof covering. Coverings include, but are not limited to, shingles, tiles and roof panels.
- ▶ **[R8] BUILDING-INTEGRATED PHOTOVOLTAIC (BIPV) ROOF PANEL.** A photovoltaic panel that functions as a component of the building envelope.
- ▶ **[R8] BUILDING-INTEGRATED PHOTOVOLTAIC (BIPV) SYSTEM.** A building system that incorporates photovoltaic modules and functions as an integral part of the building envelope, such as roof assemblies and roof coverings, exterior wall envelopes and exterior wall coverings, and fenestration.

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202 Definitions (2021 change)

18

- ▶ **ENERGY STORAGE SYSTEMS (ESS)**
- ▶ One device or multiple devices, assembled together, capable of storing electrical energy to be supplied at a future time.



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202 Impact Protective System

19

- ▶ Impact protective systems are defined as follows:
- ▶ 1. Construction that has been shown by testing to withstand the impact of test missiles and that is applied, attached or locked over exterior glazing.
- ▶ 2. For storm shelters, an assembly or device, subject to static or cyclic pressure and impact testing as detailed in ICC 500, installed to protect an opening in the storm shelter envelope.

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19

202 Definitions

20



- ▶ **LIVE/WORK UNIT**
- ▶ A dwelling unit or sleeping unit in which a significant portion of the space includes a nonresidential use that is operated by the tenant.
- ▶ The IBC regulates these in section 508.5 but they can be built under the IRC as noted earlier.

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20

202 Definitions

21

PHOTOVOLTAIC (PV) SUPPORT STRUCTURE, ELEVATED.
An independent photovoltaic (PV) panel support structure designed with usable space underneath with a clear height of not less than 7 feet 6 inches (2286 mm), intended for secondary use such as providing shade or parking of motor vehicles.

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21

22

- ▶ **SUBSTANTIAL IMPROVEMENT.** Any repair, reconstruction, rehabilitation, alteration, addition or other improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the improvement or repair is started. If the structure has sustained substantial damage, any repairs are considered substantial improvement regardless of the actual repair work performed. The term does not, however, include either:
 - ▶ 1. Any project for improvement of a building required to correct existing health, sanitary or safety code violations identified by the building official and that are the minimum necessary to assure safe living conditions.
 - ▶ 2. Any alteration of a historic structure provided that the alteration will not preclude the structure's continued designation as a historic structure. For the purposes of this exclusion, a historic building shall be any of the following:
 - ▶ 2.1 Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places.
 - ▶ 2.2 Determined by the Secretary of the US Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as a historic district.
 - ▶ 2.3 Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.

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R301.1.4 Intermodal shipping containers

- ▶ Intermodal shipping containers that are repurposed for use as buildings or structures shall be designed in accordance with the structural provisions in Section 3114 of the International Building Code.



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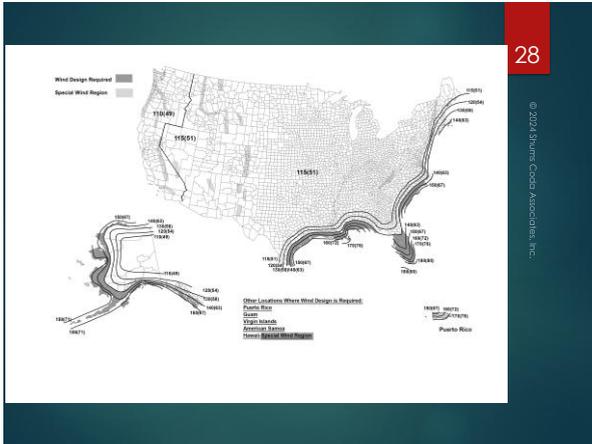
R301.2.1 Wind design criteria

- ▶ Buildings and portions thereof shall be constructed in accordance with the wind provisions of this code using the ultimate design wind speed in Table R301.2 as determined from Figure R301.2(2).



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28

R301.2.2.10 - Anchorage of water heaters

29

- In Seismic Design Categories D0, D1 and D2, and in townhouses in Seismic Design Category C, water heaters and thermal storage units shall be anchored against movement and overturning in accordance with Section M1307.2 or P2801.8.

29

R301.3 Story height

30

- Current Language (2018)
- The wind and seismic provisions of this code shall apply to buildings with story heights not exceeding the following:
 - 1. For wood wall framing, the story height shall not exceed 11 feet 7 inches and the laterally unsupported bearing wall stud height permitted by Table R602.3(5).

30

R301.3 Story height (new exception 2021)

31

▶ Exception: A story height not exceeding 13 feet 7 inches is permitted provided that the maximum wall stud clear height does not exceed 12 feet, the wall studs are in accordance with Exception 2 or 3 of Section R602.3.1 or an engineered design is provided for the wall framing members, and wall bracing for the building is in accordance with Section R602.10.

▶ Studs shall be laterally supported at the top and bottom plate in accordance with Section R602.3.

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31

R302.1 Exterior walls

32

▶ Construction, projections, openings and penetrations of exterior walls of dwellings, townhouses and accessory buildings shall comply with Table R302.1(1) based on fire separation distance ; or dwellings and townhouses equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2) based on fire separation distance .

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32

R302.1

33

▶ For the purposes of determining fire separation distance, dwellings and townhouses on the same lot shall be assumed to have an imaginary line between them. Where a new dwelling or townhouse is to be erected on the same lot as an existing dwelling or townhouse, the location of the assumed imaginary line with relation to the existing dwelling or townhouse shall be such that the existing dwelling or townhouse meets requirements of this section.

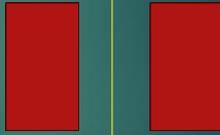
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33

R302.1

34

- ▶ Where a lot line exists between adjacent townhouse units, fire separation distance of exterior walls shall be measured to the lot line. Where a lot line does not exist between adjacent townhouse units, an imaginary line shall be assumed between the adjacent townhouse units and fire separation distance of exterior walls shall be measured to the imaginary line. Fire separation distance and requirements of Section R302.1 shall not apply to walls separating townhouse units that are required by Section R302.2.



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Exceptions:

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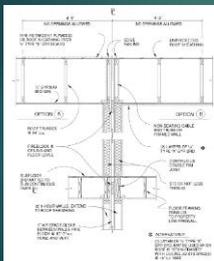
- ▶ 1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
- ▶ 2. Walls of individual dwelling units and their accessory buildings located on the same lot.
- ▶ 3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
- ▶ 4. Detached garages accessory to a dwelling unit located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
- ▶ 5. Foundation vents installed in compliance with this code are permitted.

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35

R302.2.1 Double walls

36



- ▶ Each townhouse unit shall be separated from other townhouse units by two 1-hour fire-resistance-rated wall assemblies tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code.

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R302.2.2 Common walls

37

- ▶ Common walls separating **townhouse units** shall be assigned a fire-resistance rating in accordance with Item 1 or 2 and shall be rated for fire exposure from both sides.
- ▶ Common walls shall extend to and be tight against the exterior sheathing of the exterior walls, or the inside face of exterior walls without stud cavities, and the underside of the roof sheathing.
- ▶ The common wall shared by two townhouse units shall be constructed without plumbing or mechanical equipment, ducts or vents, other than water-filled fire sprinkler piping in the cavity of the common wall.

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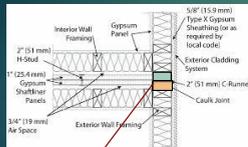
37

R302.2.2 Common walls

38

- ▶ Exception:
- ▶ Common walls are permitted to extend to and be tight against the inside of the exterior walls if the cavity between the end of the common wall and the exterior sheathing is filled with a minimum of two 2-inch nominal thickness wood studs.

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Double Stud of Exterior Wall

38

R302.2.6 Structural independence

39

- ▶ Each townhouse unit shall be structurally independent.
- ▶ Exceptions:
- ▶ 5. Townhouse units separated by a common wall as provided in Section R302.2.2, Item 1 or 2.
- ▶ 6. Townhouse units protected by a fire sprinkler system complying with Section P2904 or NFPA 13D.

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39

40

R302.3 Two-family dwellings

- ▶ Dwelling units in two-family dwellings shall be separated from each other in accordance with Sections 302.3.1 through 302.3.5, regardless of whether a lot line exists between two dwelling units.
- ▶ R302.3.2 Fire-resistance rating.
- ▶ Vertical and horizontal assemblies separating dwelling units shall have a fire-resistance rating of 1 hour, or a fire-resistance rating of one-half hour in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904. Fire-resistance ratings shall be based on testing in accordance with ASTM E119 or UL 263, or an analytical method in accordance with Section 703.2.2 of the International Building Code.



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41

R302.3.3.2 Vertical Assemblies

- ▶ Vertical assemblies separating dwelling units shall extend to and be tight against any combination of the following:
 - 1.The foundation.
 - 2.A horizontal assembly complying with Section R302.3.3.
 - 3.The underside of roof sheathing.
 - 4.The ceiling beneath an uninhabitable attic, provided that the ceiling is constructed using not less than 5/8-inch (15.9 mm) Type X gypsum board, an attic draft stop constructed as specified in Section R302.12.1 is provided above and along the vertical assembly terminating at the ceiling, and the structural framing supporting the ceiling is protected by not less than 1/2-inch (12.7 mm) gypsum board or equivalent.

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42

R302.3.6 Shared accessory rooms.

Shared accessory rooms shall be separated from each individual dwelling unit in accordance with Table R302.3.6. Openings between the shared accessory room and dwelling unit shall comply with Section R302.3.6.1.

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SEPARATION	MATERIAL
From the dwelling units and attic	Not less than 1/2-inch gypsum board or equivalent applied to the accessory room side wall.
From habitable rooms above or below the shared accessory room	Not less than 1/2-inch Type X gypsum board or equivalent.
Structures supporting floor/ceiling assemblies used for separation required by this section	Not less than 1/2-inch gypsum board or equivalent.

42

R302.5.1 Garage Opening protection

43



- ▶ Doors shall be self-latching and equipped with a self-closing or an automatic-closing device.

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R302.13 Fire protection of floors.

44

- ▶ Floor assemblies that are not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.
- ▶ New exception:
- ▶ 5. Wood floor assemblies less than 600 square feet (55.7 m2) within detached accessory structures with no habitable space above them.
- ▶ Where do you go to determine "equivalent?"

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44

R304 - Protection of wood and wood-based products against decay

45



- ▶ 1. In crawl spaces or unexcavated areas located within the periphery of the building foundation, wood joists or the bottom of a wood structural floor where closer than 18 inches to exposed ground, wood girders where closer than 12 inches to exposed ground, and wood columns where closer than 8 inches to exposed ground.

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R305 -Protection of wood and wood-based products against decay

46

- ▶ 2. Wood framing members, including columns, that rest directly on concrete or masonry exterior foundation walls and are less than 8 inches from the exposed ground.



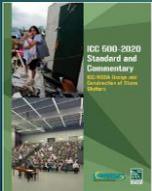
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R307.2 Storm Shelters

47

- ▶ Storm shelters shall be constructed in accordance with this code and ICC 500



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R310.3 Smoke alarm location

48



- ▶ Smoke alarms shall be installed in the following locations:
- ▶ 5. In the hallway and in the room open to the hallway in dwelling units where the ceiling height of a room open to a hallway serving bedrooms exceeds that of the hallway by 24 inches or more.
- ▶ 6. Within the room to which a sleeping loft is open, in the immediate vicinity of the sleeping loft

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R310.3.1 - Installation near cooking appliances

49

- ▶ Smoke alarms shall not be installed in the following locations unless this would prevent placement of a smoke alarm in a location required by Section R310.3.
- ▶ Exception: Smoke alarms shall be permitted to be installed not less than 6 feet (1829 mm) horizontally from a permanently installed cooking appliance where necessary to comply with Section R310.3.



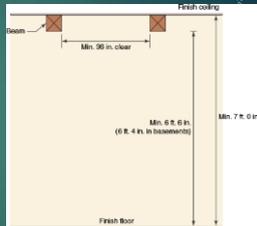
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49

R313 Minimum height.

50

- ▶ New Exception (2021)
- ▶ 4. Beams and girders spaced apart not less than 36 inches in clear finished width shall project not more than 78 inches from the finished floor.



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50

R202 Definitions

51

- ▶ **ATTIC**
- ▶ The unfinished space between the ceiling assembly and the roof assembly.
- ▶ **ATTIC, HABITABLE**
- ▶ A finished or unfinished habitable space within an attic.



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R316 Habitable attics

52



- ▶ Habitable attics shall comply with Sections R326.2 and R326.3.
- ▶ A habitable attic shall have a floor area in accordance with Section R304 and a ceiling height in accordance with Section R305.

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R316.3 Story above grade plane

53

- ▶ A habitable attic shall be considered a story above grade plane.
- ▶ Exceptions: A habitable attic shall not be considered to be a story above grade plane provided that the habitable attic meets all the following:
 - ▶ 1. The aggregate area of the habitable attic is either of the following:
 - ▶ 1.1. Not greater than one-third of the floor area of the story below.
 - ▶ 1.2. Not greater than one-half of the floor area of the story below where the habitable attic is located within a dwelling unit equipped with a fire sprinkler system in accordance with Section P2904.

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R316.3 Story above grade plane

54



- ▶ 2. The occupiable space is enclosed by the roof assembly above, knee walls, if applicable, on the sides and the floor-ceiling assembly below.
- ▶ 3. The floor of the habitable attic does not extend beyond the exterior walls of the story below.
- ▶ 4. Where a habitable attic is located above a third story, an automatic sprinkler system in accordance with Section P2904 shall be installed in the habitable attic and remaining portion of the townhouse unit or dwelling unit or units located beneath the habitable attic.

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R316.4 Means of egress

55

- ▶ The means of egress for habitable attics shall comply with the applicable provisions of Section R311.



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55

Means of egress R318 now includes stairways, hallways, landings, ramps, etc.

56

R318.7 Stairways



- ▶ Where required by this code or provided, stairways shall comply with this section.
 - ▶ Exceptions:
 - ▶ 1. Stairways not within or serving a building, porch or deck.
 - ▶ 2. Stairways leading to nonhabitable attics.
 - ▶ 3. Stairways leading to crawl spaces.
 - ▶ When is an underfloor space a basement or a crawlspace?

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R318.7.7 Stairway walking surface

57

- ▶ New Exception: (2021)
- ▶ Where the surface of a landing is required elsewhere in the code to drain surface water, the walking surface of the landing shall be sloped not steeper than 1 unit vertical in 20 units horizontal (5-percent slope) in the direction of travel.



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R318.7.9 Stairways in existing buildings

58

- ▶ Alterations to existing stairs shall not be required to comply with the requirements of this code where the existing space and construction does not allow a reduction in pitch or slope.
- ▶ Copied from the IEBC



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58

R318.8 Ramps

59

- ▶ Where required by this code or provided, ramps shall comply with this section.
 - ▶ Exception: Ramps not within or serving a building, porch or deck.
 - ▶ Where it is technically infeasible to comply because of site constraints, ramps shall have a slope of not more than 1:8



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SECTION R319 EMERGENCY ESCAPE AND RESCUE OPENINGS

60

- ▶ Basements, habitable attics, the room to which a sleeping loft is open, and every sleeping room shall have not less than one operable emergency escape and rescue opening.
- ▶ Exceptions:
 1. Basements used only to house mechanical equipment not exceeding a total floor area of 200 square feet (18.58 m²).
 2. Storm shelters constructed in accordance with ICC 500.



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R319.1 - Emergency escape and rescue opening required

61



- ▶ Basements, habitable attics, **the room to which a sleeping loft is open**, and every sleeping room shall have not less than one operable **emergency escape and rescue opening**.
- ▶ Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

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R319.1 - Emergency escape and rescue opening required

62

- ▶ New Exception: (2021)
- ▶ 4. A yard shall not be required to open directly into a public way where the yard opens to an unobstructed path from the yard to the public way.
- ▶ Such path shall have a width of not less than 36 inches



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R319.2 - Emergency escape and rescue openings

63

- ▶ Emergency escape and rescue openings shall have minimum dimensions in accordance with Sections **R319.2.1** through **R319.2.4**.
- ▶ Section reformatted in 2021 and moved in 2024



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63

R319.2.4 - Emergency escape and rescue openings under decks, porches and cantilevers

64



- ▶ Emergency escape and rescue openings installed under decks, porches and cantilevers shall be fully openable and provide a path not less than 36 inches in height and 36 inches in width to a yard or court.

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R319.5.1 Window opening control device and fall protection device height.

65

- ▶ Window opening control devices or fall protection devices shall be located at a height in accordance with Section R319.1.1 or at as low a height as the device can be installed within the existing clear opening.



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R319.7 - Alterations or repairs of existing basements

66



- ▶ New sleeping rooms created in an existing basement shall be provided with emergency escape and rescue openings in accordance with Section R319.1.
- ▶ Other than new sleeping rooms, where existing basements undergo alterations or repairs, an emergency escape and rescue opening is not required.
- ▶ Exception: An operable window complying with Section R319.7.1 shall be acceptable as an emergency escape and rescue opening.

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66

R319.7.1 - Existing emergency escape and rescue openings

67

- ▶ Where a change of occupancy would require an emergency escape and rescue opening in accordance with Section R319.1, operable windows serving as the emergency escape and rescue opening shall comply with the following:



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R319.7.1 - Existing emergency escape and rescue openings

68

- ▶ 2. A replacement window where such window complies with both of the following:
 - ▶ 2.1. The replacement window meets the size requirements in item 1.



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R319.7.1 - Existing emergency escape and rescue openings

69

- ▶ 2.2. The replacement window is the manufacturer's largest standard-size window that will fit within the existing frame or existing rough opening.
- ▶ The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.



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69

R322

Accessibility Scope

70



- ▶ Where there are four or more dwelling units or sleeping units in a single structure, the provisions of Chapter 11 of the International Building Code for Group R-3 shall apply.
- ▶ Exception: Owner-occupied lodging houses with five or fewer guestrooms are not required to be accessible.

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70

R322.2 Live/work units

71



- ▶ In live/work units, the nonresidential portion shall be accessible in accordance with Sections 508.5.9 and 508.5.11 of the International Building Code.
- ▶ In a building where there are four or more live/work units, the residential portion of the live/work unit shall comply with Section 1108.6.2.1 of the International Building Code.

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R322.3 Care facilities.

72

- ▶ Where care facilities are permitted to be constructed in accordance with Section R101.2, the portions of the dwelling used to operate a business providing care shall be accessible in accordance with Chapter 11 of the International Building Code.



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R323.1.1 Private residence elevators.

73

- ▶ The design, construction and installation of private residence elevators installed within a residential unit or providing access to one individual dwelling unit shall conform to ASME A17.1/CSA B44, Section 5.3.

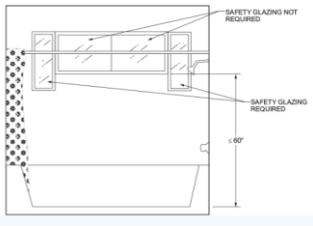


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R324.4.5 Glazing and wet surfaces

74



▶ Glazing in walls, enclosures or fences containing or facing adjacent to hot tubs, spas, whirlpools, saunas, steam rooms, bathtubs, showers and indoor or outdoor swimming pools where the bottom exposed edge of the glazing is less than 60 inches measured vertically above any standing or walking surface shall be considered to be a hazardous location.

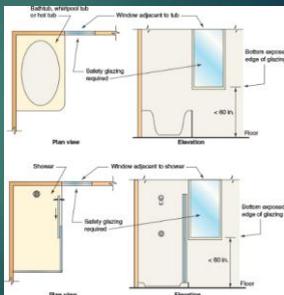
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74

R324.4.5 Glazing and wet surfaces

75

- ▶ Exception:
- ▶ Glazing that is more than 60 inches, measured horizontally and in a straight line, from the water's edge of a bathtub, hot tub, spa, whirlpool or swimming pool or from the edge of a shower, sauna or steam room.



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75

R325.1 Natural light glazed openings 76

- ▶ 1. Required glazed openings shall be permitted to face into a roofed porch, deck or patio adjacent to a street, alley, public way, yard or court, where the longer side of the roofed area is not less than 65 percent unobstructed and the ceiling height is not less than 7 feet (2134 mm).
- ▶ 2. Required glazed openings shall be permitted to face into a sunroom adjacent to a street, alley, public way, yard or court.
- ▶ 3. Glazed openings are not required where artificial light is provided that is capable of producing an average illumination of 6 footcandles (65 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.
- ▶ 4. Eave projections shall not be considered as obstructing the clear open space of a yard or court.

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76

R325.1.2 Natural Ventilation 77

- ▶ Exception Revisions
- ▶ 1. Natural ventilation shall not be required in habitable rooms other than kitchens where a whole-house mechanical ventilation system or a mechanical ventilation system capable of producing 0.35 air changes per hour in the habitable rooms is installed in accordance with Section M1505.



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77

R325.1.2 78

- ▶ 2. Natural ventilation shall not be required in kitchens where a local exhaust system is installed in accordance with Section M1505.
- ▶ Required ventilation openings shall be permitted to open into a thermally isolated sunroom or roofed porch, deck, or patio where not less than 40 percent of the roofed area perimeter is open to the outdoor air.
- ▶ 4. Required ventilation openings shall be permitted to open into a thermally isolated sunroom provided there is an openable area between the adjoining room and the sunroom of not less than one-tenth of the floor area of the interior room and not less than 20 square feet (1.9 m²). The minimum openable area of the sunroom to outdoor air shall be based on the total floor area of the adjoining room and the sunroom.



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78

R329.3

Photovoltaic systems

79



- ▶ Section 324 has been moved in entirety to section R329 and R330 for Solar Energy and Energy Storage systems, respectively, and includes all the previous PV system components.

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79

R329.6.1

Roof access and pathways

80

- ▶ New Exception:
- ▶ 4. BIPV systems listed in accordance with Section 690.12(B)(2) of NFPA 70, where the removal or cutting away of portions of the BIPV system during fire-fighting operations has been determined to not expose a fire fighter to electrical shock hazards.



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80

R329.6. -Roof access and pathways

81

- ▶ New Exception
- ▶ BIPV systems listed in accordance with [UL 3471](#), where the removal or cutting away of portions of the BIPV system during firefighting operations have been determined to not expose a firefighter to electrical shock hazards.



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81

R329.6.4 BIPV System

82

- ▶ Where building-integrated photovoltaic (BIPV) systems are installed in a manner creating areas with electrical hazards that are hidden from view, markings shall be provided to identify the hazardous areas to avoid for ladder placement. The markings shall be reflective and be visible from grade beneath the eaves or other location approved by the fire code official.
- ▶ Exception: BIPV systems listed in accordance with UL 3741, where the removal or cutting away of portions of the BIPV system during firefighting operations have been determined to not expose a firefighter to electrical shock hazards.



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82

R330 Energy storage systems

83



- ▶ Previously Stationary storage battery systems
- ▶ Energy storage systems (ESS) shall comply with the provisions of this section.
 - ▶ Exceptions:
 - ▶ 1. ESS listed and labeled in accordance with UL 9540 and marked "For use in residential dwelling units" where installed in accordance with the manufacturer's instructions and NFPA 70.
 - ▶ 2. ESS less than 1 kWh.

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83

R330.4 Locations (2021)

84

- ▶ ESS shall be installed only in the following locations:
 - ▶ 1. Detached garages and detached accessory structures.
 - ▶ 2. Attached garages separated from the dwelling unit living space in accordance with Section R302.6.
 - ▶ 3. Outdoors or on the exterior side of exterior walls located not less than 8 feet from doors and windows directly entering the dwelling unit.
 - ▶ 4. Enclosed utility closets, basements, storage or utility spaces within dwelling units with finished or noncombustible walls and ceilings. Walls and ceilings of unfinished wood-framed construction shall be provided with not less than 5/8-inch Type X gypsum wallboard.
- ▶ ESS shall not be installed in sleeping rooms, or closets or spaces opening directly into sleeping rooms.

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84

R330.5 Energy ratings (2021)

85

- ▶ Individual ESS units shall have a maximum rating of 20 kWh. The aggregate rating of the ESS shall not exceed:
 - ▶ 1. 40 kWh within utility closets, basements and storage or utility spaces.
 - ▶ 2. 80 kWh in attached or detached garages and detached accessory structures.
 - ▶ 3. 80 kWh on exterior walls.
 - ▶ 4. 80 kWh outdoors on the ground.



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85

R330.5 Energy ratings (2021)

86

- ▶ ESS installations exceeding the permitted individual or aggregate ratings shall be installed in accordance with Section 1207 of the International Fire Code.



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86

R330.8.1 Garages

87

- ▶ Where an ESS is installed in the normal driving path of vehicle travel within a garage, impact protection complying with Section R330.8.3 shall be provided. The normal driving path is a space between the garage vehicle opening and the interior face of the back wall to a height of 48 inches (1219 mm) above the finished floor. The width of the normal driving path shall be equal to the width of the garage door opening. Impact protection shall also be provided for an ESS installed at either of the following locations (see Figure R330.8.1):
- ▶ Exception: Where the clear height of the vehicle garage opening is 7 feet 6 inches (2286 mm) or less, ESS installed not less than 36 inches (914 mm) above finished floor are not subject to vehicle impact protection requirements.

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87

R332.1 - Stationary fuel cell power systems 91



▶ Stationary fuel cell power systems in new and existing buildings and structures shall comply with Section 1206 of the International Fire Code.

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91

92

TABLE R403.1.2 CONTINUOUS FOOTING REQUIREMENTS IN SEISMIC DESIGN CATEGORIES D₀, D₁ AND D₂

BUILDING PLAN DIMENSIONS	1-STORY				2-STORY				3-STORY	
	50 feet or less		> 50 feet		50 feet or less		> 50 feet		Any	
SDC	D ₀	D ₁	D ₂	D ₀	D ₁	D ₂	D ₀	D ₁	D ₂	D ₀
Continuous footings supporting exterior walls	R	R	R	R	R	R	R	R	R	R
Continuous footings supporting required interior braced wall panels	NR	NR	NR	R ^a	R ^a	NR	NR	R ^a	R ^a	R ^a

For SI: 1 foot = 304.8 mm.

R = Continuous solid or fully grouted masonry or concrete footings in accordance with Section R403.1.3.4 required.

NR = Continuous footings not required.

- a. Buildings shall be permitted to have interior braced wall panels supported on continuous foundations at intervals not exceeding 50 feet, provided that the following conditions are all met:
1. The height of cripple walls does not exceed 4 feet.
 2. First-floor braced wall panels are supported on doubled floor joists, continuous blocking or floor beams.
 3. The distance between bracing lines does not exceed twice the building width measured parallel to the braced wall line.

92

R403.1.6 Foundation anchorage 93

- ▶ New language: (2021)
- ▶ Anchor bolts shall be permitted to be located while concrete is still plastic and before it has set.
- ▶ Where anchor bolts resist placement or the consolidation of concrete around anchor bolts is impeded, the concrete shall be vibrated to ensure full contact between the anchor bolts and concrete.



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93

R403.5 Crushed stone footings for cast-in-place concrete foundations.

94

- ▶ Crushed stone footings in accordance with Section R403.4.1 shall be permitted for nonretaining cast-in-place concrete foundations complying with Section R404.1.3 and this section. The footing and foundation wall shall be installed in accordance with Figure R403.5(1), or Figure R403.5(2) and Table R403.5, or Figure R403.5(3). Crushed stone footings for cast-in-place concrete foundations shall be permitted for townhouses in Seismic Design Categories A and B and one- and two-family dwellings in Seismic Design Categories A, B and C.

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94

R408.8 Under-floor vapor retarder (2021)

95



- ▶ In Climate Zones 1A, 2A (Hidalgo, TX...that's you folks) and 3A below the warm-humid line, a continuous Class I or II vapor retarder shall be provided on the exposed face of air-permeable insulation installed between the floor joists and exposed to the grade in the under-floor space.

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95

R408.8 Under-floor vapor retarder

96



- ▶ The vapor retarder shall have a maximum water vapor permeance of 1.5 perms when tested in accordance with Procedure B of ASTM E96.
- ▶ Exception: The vapor retarder shall not be required in unvented crawl spaces constructed in accordance with Section R408.3.

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R505.1.1.1 Alternate applications

97

- ▶ Cold-formed steel floor framing for buildings exceeding the applicability limits of Section R505.1.1 is permitted to be designed and constructed in accordance with AISI S230, subject to the limits therein.



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97

502.1.1 Floor framing supporting guards

98

- ▶ Where supporting guards not exceeding 44" in height, shall be engineered; or, Section 502.11.1 or 11.2
- ▶ 502.11.1 Conventional edge framing
- ▶ 502.11.2 Timber edge framing
- ▶ Where trusses and I-joists are used as edge framing supporting guards, the effects of the guard loads shall be specifically considered in the design of the edge member.

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98

R507.1 Exterior decks

99

- ▶ Wood-framed decks shall be in accordance with this section.
- ▶ Decks shall be designed for the live load required in Section R301.5 or the ground snow load indicated in Table R301.2, whichever is greater.
- ▶ For decks using materials and conditions not prescribed in this section, refer to Section R301.



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R507.2.3 Fasteners and connectors.

100

- ▶ Holes for through bolts shall be drilled to a diameter of 1/32 inch to 1/16 inch larger than the bolt diameter. Connectors shall be installed in accordance with the manufacturer's approved instructions.



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100

R507.3 Footings (2021)

101



- ▶ Exceptions:
 2. Footings shall not be required for free-standing decks that meet all of the following criteria:
 - 2.1. The joists bear directly on precast concrete pier blocks at grade without support by beams or posts.
 - 2.2. The area of the deck does not exceed 200 square feet.
 - 2.3. The walking surface is not more than 20 inches above grade at any point within 36 inches measured horizontally from the edge.

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R507.3.2 Minimum depth

102

- ▶ Deck footings shall be placed not less than 12 inches below the undisturbed ground surface.



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R507.3.3 Frost protection (2021)

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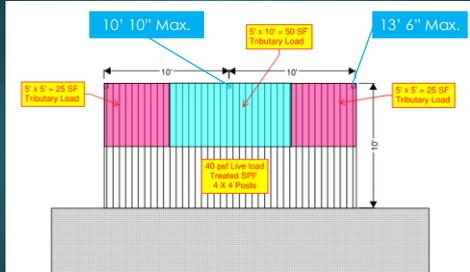
- ▶ Where decks are attached to a frost-protected structure, deck footings shall be protected from frost by one or more of the following methods:
 - ▶ 1. Extending below the frost line specified in Table R301.2.
 - ▶ 2. Erecting on solid rock.
 - ▶ 3. Other approved methods of frost protection.

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R507.4 Deck posts Calculating tributary area

10
4



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104

Table R507.5(1) (changes in 2024)

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TABLE R507.5(1) MAXIMUM DECK BEAM SPAN—40 PSF LIVE LOAD*

JOIST SPAN	JOIST SPAN LENGTH AND JOIST CANTILEVER LENGTH** (feet & inches)										
	6	8	10	12	14	16	18	20	22	24	
6	6 0 0	6 6 1 5	—	—	—	—	—	—	—	—	
8	—	8 0 0	8 6 1	9 2 7	—	—	—	—	—	—	
10	—	—	10 0 0	10 6 5	10 12 2 5	—	—	—	—	—	
12	—	—	—	12 0 0	12 6 1	12 12 2	12 6 3	—	—	—	
14	—	—	—	—	14 0 0	14 6 1	14 12 2	14 6 3 5	—	—	
16	—	—	—	—	—	16 0 0	16 6 1	16 12 2 5	—	—	
18	—	—	—	—	—	—	18 0 0	18 6 1 5	18 6 3	18 6 4 5	
20	—	—	—	—	—	—	—	—	—	—	
BEAM SPECIES†	BEAM SIZE†	MAXIMUM DECK BEAM SPAN LENGTH** (feet-inches)									
Southern pine	1-2 x 6	4-10	4-7	4-3	4-0	3-7	3-5	3-3	3-0	2-10	2-8
	1-2 x 8	6-4	5-11	5-8	5-4	4-7	4-4	4-2	3-10	3-7	3-5
	1-2 x 10	7-6	7-0	6-6	6-0	5-5	5-2	4-11	4-7	4-3	4-0
	1-2 x 12	8-8	8-3	7-8	7-1	6-4	6-1	5-10	5-5	5-0	4-9
	2-2 x 6	7-4	6-11	6-5	5-11	5-4	5-1	4-10	4-6	4-3	4-0
	2-2 x 8	9-4	8-9	8-2	7-7	6-9	6-5	6-2	5-9	5-4	5-0
	2-2 x 10	11-0	10-4	9-8	9-0	8-0	7-8	7-4	6-9	6-4	6-0
	2-2 x 12	13-0	12-2	11-4	10-7	9-6	9-0	8-7	8-0	7-5	7-0
	3-2 x 6	9-0	8-6	7-11	7-6	6-8	6-4	6-1	5-8	5-3	4-11
	3-2 x 8	11-7	10-11	10-5	9-6	8-6	8-1	7-9	7-2	6-6	6-4
3-2 x 10	13-11	13-0	12-1	11-2	10-0	9-7	9-2	8-6	7-11	7-6	
3-2 x 12	16-3	15-3	14-3	13-3	11-10	11-3	10-8	10-0	9-4	8-10	
1-2 x 6	4-5	4-1	3-8	3-6	3-0	2-10	2-8	2-5	2-3	2-1	

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105

R507.10.1.2 - Guards supported on top of deck framing

109

- ▶ Where guards are mounted on top of the decking, the guards shall be connected to the deck framing or blocking and installed in accordance with manufacturer's instructions to transfer the guard loads to the adjacent joists.



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R507.10.2 - Wood posts at deck guards

110



- ▶ Where 4-inch by 4-inch wood posts support guard loads applied to the top of the guard, such posts shall not be notched at the connection to the supporting structure.

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R507.10.3 Plastic composite guards

111

- ▶ Plastic composite guards shall comply with the provisions of Section R507.2.2.

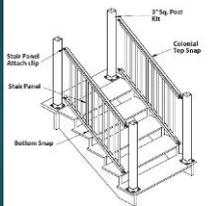


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R507.10.4 Other guards

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▶ Other guards shall be in accordance with either manufacturer's instructions or accepted engineering principles.

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Table R602.3(1) Fastening Schedule Minor changes in 2021

11
3

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENERS ^{1,2,3,4}	SPACING AND LOCATION
Roof			
1	Blocking between ceiling joists, rafters or trusses to top plate or other framing below	4-6d box (2 1/2" x 0.131") or 3-6d common (2 1/2" x 0.131") or 3-10d box (2" x 0.128") or 3-3" x 0.131" nails	Toe nail
	Blocking between rafters or truss not at the wall top plates, to rafter or truss	2-6d common (2 1/2" x 0.131") or 2-2" x 0.131" nails	Each end toe nail
	Flat blocking to truss and web filler	2-16d common (2 1/2" x 0.162") or 2" x 0.131" nails	End nail
2	Ceiling joist to top plate	1-6d common (3 1/2" x 0.162") or 3" x 0.131" nails	8" o.c. face nail
	Ceiling joist not attached to parallel rafter, lips over partitions (see Section R602.5.2 and Table R602.5.2(1))	4-6d box (2 1/2" x 0.131") or 3-6d common (2 1/2" x 0.131") or 3-10d box (2" x 0.128") or 3-3" x 0.131" nails	Per joint, toe nail
3	Ceiling joist attached to parallel rafter	4-10d box (2" x 0.128") or 3-16d common (3 1/2" x 0.162") or 4-2" x 0.131" nails	Face nail
4	Ceiling joist attached to parallel rafter (heel joint) (see Section R602.5.2 and Table R602.5.2(1))		Face nail

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R602.10.1.2 - Location of braced wall lines and permitted offsets (2021)

11
4

- ▶ Each braced wall line shall be located such that no more than two-thirds of the required braced wall panel length is located to one side of the braced wall line.
- ▶ Braced wall panels shall be permitted to be offset up to 4 feet from the designated braced wall line.
- ▶ Braced wall panels parallel to a braced wall line shall be offset not more than 4 feet from the designated braced wall line location as shown in Figure R602.10.1.1.



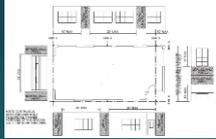
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R602.10.2.2 - Locations of braced wall panels

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- ▶ A braced wall panel shall begin within 10 feet from each end of a braced wall line as determined in Section R602.10.1.1.
- ▶ The distance between adjacent edges of braced wall panels along a braced wall line shall be not greater than 20 feet as shown in Figure R602.10.2.2.
- ▶ Exceptions:
 1. Braced wall panels in Seismic Design Categories D0, D1 and D2 shall comply with Section R602.10.2.2.1.
 2. Braced wall panels with continuous sheathing in Seismic Design Categories A, B or C shall comply with Section R602.10.7.

115

TABLE R602.10.3(1) BRACING REQUIREMENTS BASED ON WIND SPEED

11

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Ultimate Design Wind Speed (mph)	Story Location	Braced Wall Line Spacing (feet)	MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE*			
			Method LBP	Method GB	Methods DWB, WSP, SFB, PFS, PCP, HPS, BV-WSP, ABW, PPH, PFC, CS-SFB	Methods CS-WSP, CS-G, CS-PP
< 95 mph		10	2.5	2.5	1.5	1.5
		20	4.5	4.5	2.5	2.5
		30	6.5	6.5	4.0	3.5
		40	8.5	8.5	5.0	4.0
		50	10.5	10.5	6.0	5.0
		60	12.5	12.5	7.0	6.0
		10	5.0	5.0	3.0	2.5
		20	8.5	8.5	5.0	4.5
		30	12.5	12.5	7.0	6.0
		40	16.0	16.0	9.5	8.0
		50	20.0	20.0	11.5	10.0
		60	23.5	23.5	13.5	11.5
		10	NP	7.0	4.0	3.5
		20	NP	13.0	7.5	6.5
		30	NP	18.5	10.5	9.0
		40	NP	24.0	13.5	11.5
		50	NP	29.5	17.0	14.5
		60	NP	35.0	20.0	17.0

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R602.10.6.5.3 - Limited Veneer Exceeding First Story Height

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- ▶ 1. The dwelling does not extend more than two stories above grade plane.
- ▶ 2. The veneer does not exceed 5 inches in thickness.
- ▶ 3. The height of veneer on gable-end walls does not extend more than 8 feet (2438 mm) above the bearing wall top plate elevation.
- ▶ 4. Where veneer is installed on multiple walls above the first story, the total area of the veneer on the second-story exterior walls shall not exceed 25 percent of the occupied second floor area.
- ▶ 5. Where the veneer is installed on one entire second-story exterior wall, including walls on bay windows and similar appurtenances, brick veneer shall not be installed on any of the other walls on that floor.

117

R603.1.1.1 Steel Wall Framing - Alternate applications

118

- ▶ Cold-formed steel wall framing for buildings exceeding the applicability limits of Section R603.1.1 are permitted to be designed and constructed in accordance with AISI S230, subject to the limits therein.

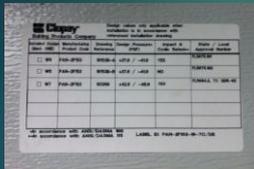


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118

R609.4.1 Garage door labeling

119



- ▶ Garage doors shall be labeled with a permanent label provided by the garage door manufacturer.
- ▶ The label shall identify the garage door manufacturer, the garage door model/series number, the positive and negative design wind pressure rating, the installation instruction drawing reference number, and the applicable test standard.
- ▶ Garage doors shall be installed in accordance with the manufacturer's installation instructions.

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SECTION R701

120

- ▶ GENERAL
- ▶ Section R701.1 relocated from before R601.1

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120

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R702.7 Vapor retarders

- ▶ Vapor retarder materials shall be classified in accordance with Table R702.7(1).
- ▶ A vapor retarder shall be provided on the interior side of frame walls of the class indicated in Table R702.7(2), including compliance with Table R702.7(3) or R702.7(4) where applicable.
- ▶ An approved design using accepted engineering practice for hygrothermal analysis shall be permitted as an alternative.
- ▶ The climate zone shall be determined in accordance with Section N1101.7.



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R702.7 Vapor retarders

- ▶ Exceptions:
 1. Basement walls.
 2. Below-grade portion of any wall.
 3. Construction where accumulation, condensation or freezing of moisture will not damage the materials.
 4. A vapor retarder shall not be required in Climate Zones 1, 2 and 3.



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R702.7.2 Vapor retarder installation

- ▶ Vapor retarders shall be installed in accordance with the manufacturer's instructions, accepted installation methods or an approved design. Where a vapor retarder also functions as a component of a continuous air barrier, the vapor retarder shall be installed as an air barrier in accordance with Section N1102.5.1.1.

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R703.4.1 Flashing installation at exterior window and door openings

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7

- ▶ 1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions.
- ▶ Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings.
- ▶ Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage.
- ▶ Openings using pan flashing shall incorporate flashing or protection at the head and sides.

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R703.4.1 Flashing installation at exterior window and door openings

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- ▶ 2. In accordance with the flashing design or method of a registered design professional.
- ▶ 3. In accordance with other approved methods



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R703.7.3 – Stucco water-resistive barriers

12
9

- ▶ Water-resistive barriers shall be installed as required in Section R703.2 and, where applied over wood-based sheathing, shall comply with Section R703.7.3.1 or Section R703.7.3.2.



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R703.7.3.1 Dry Climates

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- ▶ In dry (B) climate zones indicated in Figure N1101.7, water-resistive barriers shall comply with one of the following:
 - ▶ 1. The water-resistive barrier shall be two layers of 10-minute Grade D paper or have a water resistance equal to or greater than two layers of a water-resistive barrier complying with ASTM E2556, Type I.
 - ▶ The individual layers shall be installed independently such that each layer provides a separate continuous plane.
 - ▶ Flashing installed in accordance with Section R703.4 and intended to drain to the water-resistive barrier, shall be directed between the layers.

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R703.7.3.1 Dry Climates

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- ▶ 2. The water-resistive barrier shall be 60-minute Grade D paper or have a water resistance equal to or greater than one layer of a water-resistive barrier complying with ASTM E2556, Type II.
- ▶ The water-resistive barrier shall be separated from the stucco by a layer of foam plastic insulating sheathing or other non-water-absorbing layer or a designed drainage space.

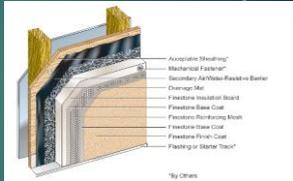
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R703.7.3.2 Moist or marine climates

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- ▶ In the moist (A) or marine (C) climate zones indicated in Figure N1101.7, water-resistive barriers shall comply with one of the following:
 - ▶ 1. In addition to complying with Section R703.7.3.1, a space or drainage material not less than 3/16 inch in depth shall be added to the exterior side of the water-resistive barrier.
 - ▶ 2. In addition to complying with Section R703.7.3.1 Item 2, drainage on the exterior side of the water-resistive barrier shall have a drainage efficiency of not less than 90 percent, as measured in accordance with ASTM E2273 or Annex A2 of ASTM E2925.



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**TABLE R703.8.4(1)
TIE ATTACHMENT AND AIRSPACE REQUIREMENTS**

BACKING AND TIE	MINIMUM TIE	MINIMUM TIE FASTENER ^a	AIRSPACE ^b	
Wood stud backing with corrugated sheet metal	22 U.S. gage (0.0299 in.) x 7/8 in. wide	#4 common nail ^c (2 1/2 in. x 0.131 in.)	Nominal 1 in. between sheathing and veneer	
Wood stud backing with adjustable metal strand wire	W1.7 (No. 9 U.S. gage; 0.148 in. dia.) with hook embedded in mortar joint ^d	#4 common nail ^c (2 1/2 in. x 0.131 in.)	Minimum nominal 1 in. between sheathing and veneer	Maximum 4 1/4 in. between backing and veneer
Wood stud backing with adjustable metal strand wire	W2.8 (0.187 in. dia.) with hook embedded in mortar joint ^d	#4 common nail ^c (2 1/2 in. x 0.131 in.)	Greater than 4 1/4 in. between backing and veneer	Maximum 6 1/4 in. between backing and veneer
Cold-formed steel stud backing with adjustable metal strand wire	W1.7 (No. 9 U.S. gage; 0.148 in. dia.) with hook embedded in mortar joint ^d	No. 10 screw extending through the steel framing a minimum of three exposed threads	Minimum nominal 1 in. between sheathing and veneer	Maximum 4 1/4 in. between backing and veneer
Cold-formed steel stud backing with adjustable metal strand wire	W2.8 (0.187 in. dia.) with hook embedded in mortar joint ^d	No. 10 screw extending through the steel framing a minimum of three exposed threads	Greater than 4 1/4 in. between backing and veneer	Maximum 6 1/4 in. between backing and veneer

For SI: 1 inch = 25.4 mm.
 a. All fasteners shall have non-inhibitive coating suitable for the installation in which they are being used, or be manufactured from material not susceptible to corrosion.
 b. An airspace that provides drainage shall be permitted to contain mortar from construction.
 c. In Seismic Design Category D_s, E_s or F_s, the minimum tie fastener shall be an #4 ring-shank nail (2 1/2 in. x 0.131 in.).
 d. Adjustable tie plates shall include not fewer than 1 plate leg of wire size W2.8 (MW18) with a maximum offset of 1 1/2 inches.
 e. Adjustable tie plates shall include not fewer than 2 plate legs with a maximum offset of 1 1/2 inches. Distance between inside face of track and end of plate shall be a maximum of 2 inches.
 f. Adjustable tie backing attachment components shall consist of one of the following: eyes with minimum wire W2.8 (MW18), barrel with minimum 3/8 inch outside diameter, or plate with minimum thickness of 0.074 inch and minimum width of 1 1/4 inches.

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**TABLE R703.11.2
REQUIRED MINIMUM WIND LOAD DESIGN PRESSURE RATING FOR VINYL SIDING INSTALLED OVER FOAM PLASTIC SHEATHING ALONE**

ULTIMATE DESIGN WIND SPEED (MPH)	ADJUSTED MINIMUM DESIGN WIND PRESSURE (ASD) (PSF) ^a					
	Case 1: With interior gypsum wallboard ^b			Case 2: Without interior gypsum wallboard ^b		
	Exposure		D	Exposure		D
	B	C			B	
≤95	-30.0	-33.2	-39.4	-33.9	-47.4	-56.2
100	-30.0	-36.8	-43.6	-37.2	-52.5	-62.2
105	-30.0	-40.5	-48.1	-41.4	-57.9	-68.6
110	-31.8	-44.5	-52.8	-45.4	-63.5	-75.3
115	-35.5	-49.7	-59.0	-50.7	-71.0	-84.2
120	-37.4	-52.4	-62.1	-53.4	-74.8	-88.6
130	-44.9	-62.8	-74.5	-64.1	-89.7	-106
> 130	See Note d					

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m², 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.
 a. Linear interpolation is permitted.
 b. The table values are based on a maximum 36-foot mean roof height, and effective wind area of 10 square feet Wall Zone 5 (corner), and the ASD design component and cladding wind pressure from Table R301.2.1(1), adjusted for exposure in accordance with Table R301.2.1(2), multiplied by the following adjustment factors: 1.87 (Case 1) and 2.07 (Case 2).
 c. Gypsum wallboard, gypsum panel product or equivalent.
 d. For the indicated wind speed condition and where foam sheathing is the only sheathing on the exterior of a frame wall with vinyl siding, the wall assembly shall be capable of resisting an impact without puncture at least equivalent to that of a wood frame wall with minimum 1/2-inch OSB sheathing as tested in accordance with ASTM E1886. The vinyl siding shall comply with an adjusted design wind pressure requirement in accordance with Note b, using an adjustment factor of 2.67.

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R704.1 - Soffits General wind limitations

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- ▶ Where the design wind pressure is 30 pounds per square foot or less, soffits shall comply with section R704.2.
- ▶ Where the design wind pressure exceeds 30 pounds per square foot, soffits shall comply with section R704.3.
- ▶ The design wind pressure on soffits shall be determined using line component and cladding loads specified in Table R301.2.1(1) for walls using an effective wind area of 10 square feet and adjusted for height and exposure in accordance with Table R301.2.1(2).



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R704.1 - Soffits General wind limitations

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- ▶ R704.2 Soffit installation where the design wind pressure is 30 psf or less.
- ▶ Where the design wind pressure is 30 pounds per square foot or less, soffit installation shall comply with Section R704.2.1, R704.2.2, R704.2.3 or R704.2.4.
- ▶ Soffit materials not addressed in Sections R704.2.1 through R704.2.4 shall be in accordance with the manufacturer's installation instructions.

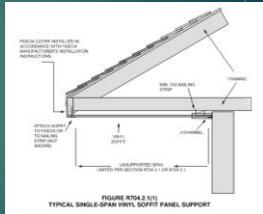
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R704.2.1 Vinyl soffit panels

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- ▶ Vinyl soffit panels shall be installed using fasteners specified by the manufacturer and shall be fastened at both ends to a supporting component such as a nailing strip, fascia or subfascia component in accordance with Figure R704.2.1(1).



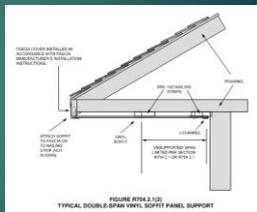
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R704.2.1 Vinyl soffit panels

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- ▶ Where the unsupported span of soffit panels is greater than 16 inches, intermediate nailing strips shall be provided in accordance with Figure R704.2.1(2).
- ▶ Vinyl soffit panels shall be installed in accordance with the manufacturer's installation instructions.
- ▶ Fascia covers shall be installed in accordance with the manufacturer's installation instructions.



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R704.2.2 Fiber-cement soffit panels

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- ▶ Fiber-cement soffit panels shall be a minimum of 1/4 inch in thickness and shall comply with the requirements of ASTM C1186, Type A, minimum Grade II, or ISO 8336, Category A, minimum Class 2. Panel joints shall occur over framing or over wood structural panel sheathing.
- ▶ Soffit panels shall be installed with spans and fasteners in accordance with the manufacturer's installation instructions.

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R704.2.3 Hardboard soffit panels

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- ▶ Hardboard soffit panels shall be not less than 7/16 inch in thickness and shall be fastened to framing or nailing strips with 2 1/2-inch by 0.113-inch siding nails spaced not more than 6 inches on center at panel edges and 12 inches on center at intermediate supports.



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R704.2.4 Wood structural panel soffit

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- ▶ The minimum nominal thickness for wood structural panel soffits shall be 3/8 inch and shall be fastened to framing or nailing strips with 2-inch by 0.099-inch nails.
- ▶ Fasteners shall be spaced not less than 6 inches on center at panel edges and 12 inches on center at intermediate supports.

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R704.3 Soffit installation where the design wind pressure exceeds 30 psf

- ▶ Where the design wind pressure is greater than 30 psf, soffit installation shall comply with Section R704.3.1, R704.3.2, R704.3.3 or R704.3.4.
- ▶ Soffit materials not addressed in Sections R704.3.1 through R704.3.4 shall be in accordance with the manufacturer's installation instructions.



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R704.3.1 Vinyl soffit panels

- ▶ Vinyl soffit panels and their attachments shall be capable of resisting wind loads specified in Table R301.2.1(1) for walls using an effective wind area of 10 square feet and adjusted for height and exposure in accordance with Table R301.2.1(2).
- ▶ Vinyl soffit panels shall be installed using fasteners specified by the manufacturer and shall be fastened at both ends to a supporting component such as a nailing strip, fascia or subfascia component in accordance with Figure R704.2.1(1).



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R704.3.1 Vinyl soffit panels

- ▶ Where the unsupported span of soffit panels is greater than 12 inches, intermediate nailing strips shall be provided in accordance with Figure R704.2.1(2).
- ▶ Vinyl soffit panels shall be installed in accordance with the manufacturer's installation instructions. Fascia covers shall be installed in accordance with the manufacturer's installation instructions.



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R802.1.5 Fire-retardant-treated wood

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- ▶ Fire-retardant-treated wood (FRTW) is any wood product that, when impregnated with chemicals by a pressure process or other means during manufacture, shall have, when tested in accordance with ASTM E84 or UL 723, a listed flame spread index of 25 or less.
- ▶ In addition, the ASTM E84 or UL 723 Test shall be continued for an additional 20-minute period and the flame front shall not progress more than 10.5 feet beyond the center line of the burners at any time during the test.



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R802.1.5.2 Other means during manufacture

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- ▶ For wood products impregnated with chemicals by other means during manufacture, the treatment shall be an integral part of the manufacturing process of the wood product.
- ▶ The treatment shall provide permanent protection to all surfaces of the wood product.
- ▶ The use of paints, coating, stains or other surface treatments is not an approved method of protection as required by this section.

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R802.3 Ridge

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- ▶ A ridge board used to connect opposing rafters shall be not less than 1 inch nominal thickness and not less in depth than the cut end of the rafter.
- ▶ Where ceiling joist or rafter ties do not provide continuous ties across the structure as required by Section R802.5.2, the ridge shall be supported by a wall or ridge beam, designed in accordance with accepted engineering practice and supported on each end by a wall or column.



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R802.5 Ceiling joists



- ▶ Ceiling joists shall be continuous across the structure or securely joined where they meet over interior partitions in accordance with Section R802.5.2.1.
- ▶ Ceiling joists shall be fastened to the top plate in accordance with Table R602.3(1).

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R802.5.2 - Ceiling joist and rafter connections

- ▶ Where ceiling joists run parallel to rafters and are located in the bottom third of the rafter height, they shall be installed in accordance with Figure R802.4.5 and fastened to rafters in accordance with Table R802.5.2(1).
- ▶ Where the ceiling joists are installed above the bottom third of the rafter height, the ridge shall be designed as a beam in accordance with Section R802.3.
- ▶ Where ceiling joists do not run parallel to rafters, rafters shall be tied across the structure with a rafter tie in accordance with Section R802.5.2.2, or the ridge shall be designed as a beam in accordance with Section R802.3.

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RAFTER SLOPE	RAFTER SPACING (inches)	GROUND SNOW LOAD (psf)																								
		20°				30°				50°				70°												
		12	24	36	48	12	24	36	48	12	24	36	48	12	24	36	48									
Required number of 16d common nails per heel joint splice ^{a, b, c, d, e}																										
3:12	12	3	5	8	3	6	9	5	9	13	6	12	17	16	4	7	10	4	8	12	6	12	17	8	15	23
	19.2	4	8	12	5	10	14	7	14	21	9	18	27	34	5	10	15	6	12	18	9	17	26	12	23	34
	24	3	4	6	3	5	7	4	7	10	5	9	13	12	3	4	6	3	5	7	4	7	10	5	9	13
4:12	12	3	5	8	3	6	9	5	9	13	6	12	17	16	3	5	8	3	6	9	5	9	13	6	12	17
	19.2	3	6	9	4	7	11	6	11	16	7	14	21	24	4	8	11	5	9	13	7	13	19	9	17	26
	24	3	3	5	3	4	6	3	6	8	4	7	11	12	3	3	5	3	4	6	3	6	8	4	7	11
5:12	12	3	4	6	3	5	7	4	7	11	5	9	14	16	3	4	6	3	5	7	4	7	11	5	9	14
	19.2	3	5	7	3	6	9	5	9	13	6	11	17	24	3	5	7	3	6	9	5	9	13	6	11	17
	24	3	6	9	4	7	11	6	11	16	7	14	21													

f. Tabulated heel joint connection requirements assume that ceiling joists or rafter ties are located at the bottom of the attic space. Where ceiling joists or rafter ties are located higher in the attic, heel joint connection requirements shall be increased by the adjustment factors in Table 802.5.2(2).

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R802.5.2 - Ceiling joist and rafter connections

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TABLE R802.5.2(2)
HEEL JOINT CONNECTION ADJUSTMENT FACTORS

$H_c/H_r^{a,b}$	HEEL JOINT CONNECTION ADJUSTMENT FACTOR
1/3	1.5
1/4	1.33
1/5	1.25
1/6	1.2
1/10 or less	1.11

a. H_c = Height of ceiling joists or rafter ties measured vertically from the top of the rafter support walls to the bottom of the ceiling joists or rafter ties; H_r = Height of roof ridge measured vertically from the top of the rafter support walls to the bottom of the roof ridge.
b. Where H_c/H_r exceeds 1/3, connections shall be designed in accordance with accepted engineering practice.

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R802.6 Bearing

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- ▶ The ends of each rafter or ceiling joist shall have not less than 1 1/2 inches of bearing on wood or metal and not less than 3 inches on masonry or concrete.
- ▶ The bearing on masonry or concrete shall be direct, or a sill plate of 2-inch minimum nominal thickness shall be provided under the rafter or ceiling joist.



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R802.6 Bearing

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- ▶ The sill plate shall provide a minimum nominal bearing area of 48 square inches.
- ▶ Where the roof pitch is greater than or equal to 3 units vertical in 12 units horizontal, and ceiling joists or rafter ties are connected to rafters to provide a continuous tension tie in accordance with Section R802.5.2, vertical bearing of the top of the rafter against the ridge board shall satisfy this bearing requirement.



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R804.1.1.1 Alternate applications

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- ▶ Cold-formed steel roof and ceiling framing for buildings exceeding the applicability limits of Section R804.1.1 is permitted to be designed and constructed in accordance with AISI S230, subject to the limits therein.

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R902.3 - Building-integrated photovoltaic product

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- ▶ Building-integrated photovoltaic (BIPV) products installed as the roof covering shall be tested, listed and labeled for fire classification in accordance with UL 7103.
- ▶ Class A, B or C BIPV products shall be installed where the edge of the roof is less than 3 feet from a lot line.



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R905.3.1 Deck requirements

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- ▶ Concrete and clay tile shall be installed only over solid sheathing.
- ▶ Exception: Spaced lumber sheathing in accordance with Section R803.1 shall be permitted in Seismic Design Categories A, B and C.

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R905.4.4.1 - Wind resistance of metal roof shingles

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- ▶ Metal roof shingles applied to a solid or closely fitted deck shall be tested in accordance with ASTM D3161, FM 4474, UL 580 or UL 1897.
- ▶ Metal roof shingles tested in accordance with ASTM D3161 shall meet the classification requirements of Table R905.4.4.1 for the appropriate maximum basic wind speed and the metal shingle packaging shall bear a label to indicate compliance with ASTM D3161 and the required classification in Table R905.2.4.1.



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R905.4.4.1 - Wind resistance of metal roof shingles

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TABLE R905.4.4.1
CLASSIFICATION OF STEEP SLOPE METAL ROOF SHINGLES TESTED IN ACCORDANCE WITH ASTM D3161

MAXIMUM ULTIMATE DESIGN WIND SPEED, V_{u} FROM FIGURE R301.2(2) (mph)	MAXIMUM BASIC WIND SPEED, V_{bz} FROM TABLE R301.2.1.3 (mph)	ASTM D3161 SHINGLE CLASSIFICATION
110	85	A, D or E
116	90	A, D or E
129	100	A, D or E
142	110	E
155	120	E
168	130	E
181	140	E
194	150	E

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R1001.13 Fireplace accessories

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- ▶ Listed and labeled fireplace accessories shall be installed in accordance with the conditions of the listing and the manufacturer's instructions.
- ▶ Fireplace accessories shall comply with UL 907.



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N1101.5 (R103.2) Information on construction documents

- Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed.
- Details shall include the following as applicable:
 - Energy compliance path.
- Remainder unchanged

Prescriptive Compliance

Total Building Performance

Energy Rating Index

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N1101.6 (R202) Defined terms

- HIGH EFFICACY LAMPS LIGHT SOURCES.** Compact fluorescent lamps, light-emitting diode (LED) lamps, T-8 or smaller diameter linear fluorescent lamps, or other lamps with an efficacy of not less than the following: 65 lumens per watt, or luminaires with an efficacy of not less than 45 lumens per watt.
 - 60 lumens per watt for lamps over 40 watts.
 - 50 lumens per watt for lamps over 15 watts to 40 watts.
 - 40 lumens per watt for lamps 15 watts or less.



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Changes to some County's Climate Zone

TABLE N1101.7 (R301.1)—continued
CLIMATE ZONES, MOISTURE REGIMES, AND WARM HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY*

US STATES—continued	6B Sun Miguel
CONNECTICUT	5B Sedgwick
5B Center	7 Summit
5B Delta	5B Teller
5B Denver	5B Washington
6B Dolores	5B Weld
5B Douglas	5B Yuma
6B Eagle	CONNECTICUT
5B Elbert	5A (all)
5B El Paso	DELAWARE
5B Fremont	4A (all)
5B Garfield	DISTRICT OF COLUMBIA
5B Gilpin	4A (all)
7 Grand	FLORIDA
7 Gunnison	2A Alachua*
7 Hinsdale	2A Baker*

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N1101.13 (R401.2) Application

- ▶ Residential buildings shall comply with Section N1101.13.5 and Section N1101.13.1, N1101.13.2, N1101.13.3 or N1101.13.4.
- ▶ Exception: Additions, alterations, repairs and changes of occupancy to existing buildings complying with Section N1109.
- ▶ N1101.13.1 (R401.2.1) Prescriptive Compliance Option.
- ▶ N1101.13.2 (R401.2.2) Total Building Performance Option.
- ▶ N1101.13.3 (R401.2.3) Energy Rating Index Option.
- ▶ N1101.13.4 (R401.2.4) Tropical Climate Region Option.
- ▶ N1101.13.5 (R401.2.5) Additional energy efficiency.

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N1101.13.5 (R401.2.5) Additional energy efficiency

- ▶ This section establishes additional requirements applicable to all compliance approaches to achieve additional energy efficiency.
- ▶ 1. For buildings complying with Section N1101.13.1, one of the additional efficiency package options shall be installed according to Section N1108.2.
 - ▶ N1108.2.1 (R408.2.1) Enhanced envelope performance option
 - ▶ N1108.2.2 (R408.2.2) More efficient HVAC equipment performance option.
 - ▶ N1108.2.3 (R408.2.3) Reduced energy use in service water-heating option.
 - ▶ N1108.2.4 (R408.2.4) More efficient duct thermal distribution system option.
 - ▶ N1108.2.5 (R408.2.5) Improved air sealing and efficient ventilation system option.

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N1101.13.5 (R401.2.5) Additional energy efficiency

- ▶ 2. For buildings complying with Section N1101.13.2, the building shall meet one of the following.
 - ▶ 2.1. One of the additional efficiency package options in Section N1108.2 shall be installed without including such measures in the proposed design under Section N1105.
 - ▶ 2.2. The proposed design of the building under Section N1105.3 shall have an annual energy cost that is less than or equal to 95 percent of the annual energy cost of the standard reference design.



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TABLE N1102.1.2 (R402.1.2)
MAXIMUM ASSEMBLY U-FACTORS* AND FENESTRATION REQUIREMENTS

CLIMATE ZONE	FENESTRATION U-FACTOR*	SKYLIGHT U-FACTOR*	GLAZED FENESTRATION SHGC**	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR*	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	SLAB SPACE** WALL U-FACTOR	CRAWL SPACE** WALL U-FACTOR
0	0.50	0.75	0.25	0.035	0.084	0.197	0.064	0.360	0.477	0.477
1	0.50	0.75	0.25	0.035	0.084	0.197	0.064	0.360	0.477	0.477
2	0.40	0.65	0.25	0.026	0.084	0.165	0.064	0.360	0.477	0.477
3	0.30	0.55	0.25	0.026	0.060	0.098	0.047	0.091 ¹	0.136	0.136
4 except Marine ³	0.30	0.55	0.40	0.024	0.045	0.098	0.047	0.059	0.065	0.065
5 and Marine 4	0.30	0.55	NR	0.024	0.045	0.082	0.033	0.050	0.055	0.055
6	0.30	0.55	NR	0.024	0.045	0.060	0.033	0.050	0.055	0.055
7 and 8	0.30	0.55	NR	0.024	0.045	0.087	0.028	0.050	0.055	0.055

For SI, 1 foot = 304.8 mm.
 * Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.
 ** Mass walls shall be in accordance with Section R402.2.5. Where more than half the insulation is on the interior, the mass wall U-factors shall not exceed 0.17 in Climate Zones 0 and 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.
 *** In Warm Humid locations as defined by Figure R301.1 and Table R301.1, the basement wall U-factor shall not exceed 0.360.
 **** The SHGC column applies to all glazed fenestration.
 ***** Exception: In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed 0.30.
 ***** There are no SHGC requirements in the Marine Zone.
 ***** 1. A maximum U-factor of 0.32 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
 ***** 1. Above 4,000 feet in elevation above sea level, or
 ***** 2. In windborne debris regions where protection of openings is required by Section R301.2.1.2.

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N1102.1.3 (R402.1.3) R-value alternative



▶ Assemblies with R-value of insulation materials equal to or greater than that specified in Table N1102.1.3 shall be an alternative to the U-factor in Table N1102.1.2.

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TABLE N1102.1.3 (R402.1.3)
INSULATION MINIMUM R-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT*

CLIMATE ZONE	FENESTRATION U-FACTOR*	SKYLIGHT U-FACTOR*	GLAZED FENESTRATION SHGC**	CEILING R-VALUE	WOOD-FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT WALL R-VALUE	SLAB R-VALUE & DEPTH	CRAWL SPACE** WALL R-VALUE
0	NR	0.75	0.25	30	13 or 0+10	3/4	13	0	0	0
1	NR	0.75	0.25	30	13 or 0+10	3/4	13	0	0	0
2	0.40	0.65	0.25	49	13 or 0+10	4/6	13	0	0	0
3	0.30	0.55	0.25	49	20 or 13 + 5ci or 0+15	8/13	19	5ci or 13"	10ci, 2 ft	5ci or 13"
4 except Marine ³	0.30	0.55	0.40	60	20 + 5 or 13 + 10ci or 0+15	8/13	19	10ci or 13"	10ci, 4 ft	10ci or 13"
5 and Marine 4	0.30	0.55	0.40	60	20 + 5 or 13 + 10ci or 0+15	13/17	30	15ci or 19 or 13 + 5ci	10ci, 4 ft	15ci or 19 or 13 + 5ci
6	0.30	0.55	NR	60	20 + 5ci or 13 + 10ci or 0+20	15/20	30	15ci or 19 or 13 + 5ci	10ci, 4 ft	15ci or 19 or 13 + 5ci
7 and 8	0.30	0.55	NR	60	20 + 5ci or 13 + 10ci or 0+20	19/21	38	15ci or 19 or 13 + 5ci	10ci, 4 ft	15ci or 19 or 13 + 5ci

1. A maximum U-factor of 0.32 shall apply in Climate Zones 3 through 8 to vertical fenestration products installed in buildings located either:
 1. Above 4,000 feet in elevation, or
 2. In windborne debris regions where protection of openings is required by Section R301.2.1.2.

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N1102.1.4 (R402.1.4) R-value computation

- ▶ Cavity insulation alone shall be used to determine compliance with the cavity insulation R-value requirements in Table N1102.1.3.
- ▶ Where cavity insulation is installed in multiple layers, the R-values of the cavity insulation layers shall be summed to determine compliance with the cavity insulation R-value requirements.
- ▶ The manufacturer's settled R-value shall be used for blown-in insulation.
- ▶ Continuous insulation (ci) alone shall be used to determine compliance with the continuous insulation R-value requirements in Table N1102.1.3.



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N1102.1.4 (R402.1.4) R-value computation

- ▶ Where continuous insulation is installed in multiple layers, the R-values of the continuous insulation layers shall be summed to determine compliance with the continuous insulation R-value requirements.
- ▶ Cavity insulation R-values shall not be used to determine compliance with the continuous insulation R-value requirements in Table N1102.1.3.



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N1102.1.4 (R402.1.4) R-value computation

- ▶ Computed R-values shall not include an R-value for other building materials or air films.
- ▶ Where insulated siding is used for the purpose of complying with the continuous insulation requirements of Table N1102.1.3, the manufacturer's labeled R-value for insulated siding shall be reduced by R-0.6.



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N1102.2.3 (R402.2.3) Eave baffle

- ▶ For air-permeable insulations in vented attics, a baffle shall be installed adjacent to soffit and eave vents. Baffles shall maintain a net free area opening equal or greater than the size of the vent.
- ▶ The baffle shall extend over the top of the attic insulation.



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N1102.2.3 (R402.2.3) Eave baffle

- ▶ The baffle shall be permitted to be any solid material.
- ▶ The baffle shall be installed to the outer edge of the exterior wall top plate so as to provide maximum space for attic insulation coverage over the top plate.
- ▶ Where soffit venting is not continuous, baffles shall be installed continuously to prevent ventilation air in the eave soffit from bypassing the baffle.



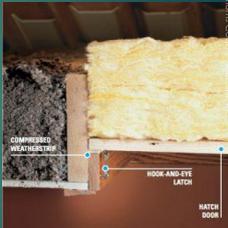
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N1102.2.4 (R402.2.4) Access hatches and doors

- ▶ Access hatches and doors from conditioned spaces such as attics and crawl spaces shall be insulated to the same R-value required by Table N1102.1.3 for the wall or ceiling in which they are installed.
- ▶ Exceptions!



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N1102.2.4(R402.2.4) Access hatches and doors

- ▶ Exceptions:
- ▶ 1. Vertical doors providing access from conditioned spaces to unconditioned spaces that comply with the fenestration requirements of Table N1102.1.3 based on the applicable climate zone specified in Chapter 3.



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N1102.2.4(R402.2.4) Access hatches and doors

- ▶ 2. Horizontal pull-down, stair-type access hatches in ceiling assemblies that provide access from conditioned to unconditioned spaces in Climate Zones 0 through 4 shall not be required to comply with the insulation level of the surrounding surfaces provided that the hatch meets all of the following:
- ▶ 2.1. The average U-factor of the hatch shall be less than or equal to U-0.10 or have an average insulation R-value of R-10 or greater.



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N1102.2.4(R402.2.4) Access hatches and doors

- ▶ 2.2. Not less than 75 percent of the panel area shall have an insulation R-value of R-13 or greater.
- ▶ 2.3. The net area of the framed opening shall be less than or equal to 13.5 square feet.
- ▶ 2.4. The perimeter of the hatch edge shall be weatherstripped.
- ▶ The reduction shall not apply to the total UA alternative in Section N1102.1.5.



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N1102.2.4.1 (R402.2.4) Access hatch doors and insulation retention.

- ▶ Vertical or horizontal access hatches and doors from conditioned spaces to unconditioned spaces such as attics and crawl spaces shall be weatherstripped.
- ▶ Access that prevents damaging or compressing the insulation shall be provided to all equipment.



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N1102.2.4.1 (R402.2.4) Access hatch doors and insulation retention.

- ▶ Where loose-fill insulation is installed, a wood-framed or equivalent baffle or retainer, or dam shall be installed to prevent loose-fill insulation from spilling into living spaces, from higher to lower sections of the attic, and from attics covering conditioned spaces to unconditioned spaces.
- ▶ The baffle or retainer shall provide a permanent means of maintaining the installed R-value of the loose-fill insulation.



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N1102.2.7 (R402.2.7) Walls with partial structural sheathing

- ▶ Where Section N1102.1.2 requires continuous insulation on exterior walls and structural sheathing covers 40 percent or less of the gross area of all exterior walls, the required continuous insulation R-value shall be permitted to be reduced by an amount necessary, but not more than R-3, to result in a consistent total sheathing thickness on areas of the walls covered by structural sheathing. This reduction shall not apply to the U-factor alternative in Section N1102.1.4 and the Total UA alternative in Section N1102.1.5.



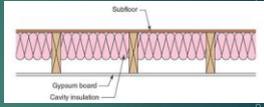
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N1 102.2.7(R402.2.7) Floors

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- ▶ Floor cavity insulation shall comply with one of the following:
 - ▶ 1. Insulation shall be installed to maintain permanent contact with the underside of the subfloor decking in accordance with manufacturer instructions to maintain required R-value or readily fill the available cavity space.



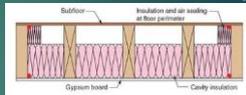
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N1 102.2.7(R402.2.7) Floors

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- ▶ 2. Floor framing cavity insulation shall be permitted to be in contact with the top side of sheathing separating the cavity and the unconditioned space below. Insulation shall extend from the bottom to the top of all perimeter floor framing members and the framing members shall be air sealed.



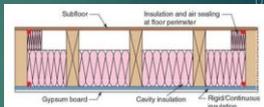
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N1 102.2.7(R402.2.7) Floors

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- ▶ 3. A combination of cavity and continuous insulation shall be installed so that the cavity insulation is in contact with the top side of the continuous insulation that is installed on the underside of the floor framing separating the cavity and the unconditioned space below.
- ▶ The combined R-value of the cavity and continuous insulation shall equal the required R-value for floors. Insulation shall extend from the bottom to the top of all perimeter floor framing members and the framing members shall be air sealed.



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N1102.2.8 (R402.2.8) Basement walls



- ▶ Basement walls shall be insulated in accordance with Table N1102.1.3.
- ▶ Exception; Basement walls associated with unconditioned basements where all of the following requirements are met:
 - ▶ 1. The floor overhead, including the underside stairway stringer leading to the basement, is insulated in accordance with Section N1102.1.3 and applicable provisions of Sections N1102.2 and N1102.2.7.

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N1102.2.8 (R402.2.8) Basement walls



- ▶ 2. There are no uninsulated duct, domestic hot water or hydronic heating surfaces exposed to the basement.
- ▶ 3. There are no HVAC supply or return diffusers serving the basement.
- ▶ 4. The walls surrounding the stairway and adjacent to conditioned space are insulated in accordance with Section N1102.1.3 and applicable provisions of Section N1102.2.

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N1102.2.8 (R402.2.8) Basement walls



- ▶ 5. The door(s) leading to the basement from conditioned spaces are insulated in accordance with Section N1102.1.3 and applicable provisions of Section N1102.2, and weatherstripped in accordance with Section N1102.4.
- ▶ 6. The building thermal envelope separating the basement from adjacent conditioned spaces complies with Section N1102.4.

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N1102.4.1.2 (R402.4.1.2) Testing

19
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- ▶ The building or dwelling unit shall be tested for air leakage.
- ▶ The maximum air leakage rate for any building or dwelling unit under any compliance path shall not exceed 5.0 air changes per hour or 0.28 cubic feet per minute per square foot of dwelling unit enclosure area

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N1102.4.1.2 (R402.4.1.2) Testing

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- ▶ New Exception:
- ▶ For heated, attached private garages and heated, detached private garages accessory to one- and two-family dwellings and townhouses not more than three stories above grade plane in height, building envelope tightness and insulation installation shall be considered acceptable where the items in Table N1102.4.1.1, applicable to the method of construction, are field verified.



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N1102.4.1.2 (R402.4.1.2) Testing

19
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- ▶ Where required by the code official, an approved third party independent from the installer shall inspect both air barrier and insulation installation criteria.
- ▶ Heated, attached private garage space and heated, detached private garage space shall be thermally isolated from all other conditioned spaces in accordance with Sections N1102.2.12 and N1102.3.5, as applicable.



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N1102.4.1.2 (R402.4.1.2) Testing

19
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- ▶ Additional Exception:
- ▶ When testing individual dwelling units, an air leakage rate not exceeding 0.30 cubic feet per minute per square foot of the dwelling unit enclosure area, tested in accordance with ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch water gauge, shall be permitted in all climate zones for:
 - ▶ 1. Attached single- and multiple-family building dwelling units.
 - ▶ 2. Buildings or dwelling units that are 1,500 square feet or smaller.



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N1102.4.1.2 (R402.4.1.2) Testing

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- ▶ Mechanical ventilation shall be provided in accordance with Section M1505 of this code or Section 403.3.2 of the International Mechanical Code, as applicable, or with other approved means of ventilation.



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N1102.4.1.3 (R402.4.1.3) Leakage rate

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- ▶ Where complying with Section N1101.13.1, the building or dwelling unit shall have an air leakage rate not exceeding 5.0 air changes per hour in Climate Zones 0, 1 and 2, and 3.0 air changes per hour in Climate Zones 3 through 8, when tested in accordance with Section N1102.4.1.2.



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

20
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- ▶ Electrical and communication outlet boxes installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces.
- ▶ Electrical and communication outlet boxes shall be tested in accordance with NEMA OS 4, Requirements for Air-Sealed Boxes for Electrical and Communication Applications, and shall have an air leakage rate of not greater than 2.0 cubic feet per minute at a pressure differential of 1.57 psf).



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

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- ▶ Electrical and communication outlet boxes shall be marked "NEMA OS 4" or "OS 4" in accordance with NEMA OS 4. Electrical and communication outlet boxes shall be installed per the manufacturer's instructions and with any supplied components required to achieve compliance with NEMA OS 4.



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N1103.3.1 (R403.3.1) Ducts located outside conditioned space

20
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- ▶ Added language:
- ▶ Ducts buried beneath a building shall be insulated as required by this section or have an equivalent thermal distribution efficiency.
- ▶ Under-ground ducts utilizing the thermal distribution efficiency method shall be listed and labeled to indicate the R-value equivalency.



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N1103.3.2 (R403.3.2) Ducts located in conditioned space.

205

- ▶ New Conditions:
- ▶ 3. Ductwork in floor cavities located over unconditioned space shall have the following:
 - ▶ 3.1. A continuous air barrier installed between unconditioned space and the duct.
 - ▶ 3.2. Insulation installed in accordance with Section N1102.2.7.
 - ▶ 3.3. A minimum R-19 insulation installed in the cavity width separating the duct from unconditioned space.



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N1103.3.2 (R403.3.2) Ducts located in conditioned space.

206

- ▶ 4. Ductwork located within exterior walls of the building thermal envelope shall have the following:
 - ▶ 4.1. A continuous air barrier installed between unconditioned space and the duct.
 - ▶ 4.2. Minimum R-10 insulation installed in the cavity width separating the duct from the outside sheathing.
 - ▶ 4.3. The remainder of the cavity insulation fully insulated to the drywall side.



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N1103.3.5 (R403.3.5) Duct testing

207

- ▶ New Exception:
- ▶ A duct air-leakage test shall not be required for ducts serving heating, cooling or ventilation systems that are not integrated with ducts serving heating or cooling systems.



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N1103.3.6 (R403.3.6) Duct leakage

208



- ▶ New Condition:
- ▶ 3. Test for ducts within thermal envelope: Where all ducts and air handlers are located entirely within the building thermal envelope, total leakage shall be less than or equal to 8.0 cubic feet per minute per 100 square feet of conditioned floor area.

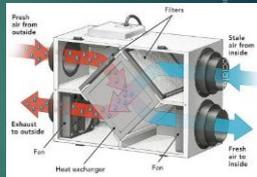
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N1103.6.1 (R403.6.1) Heat or energy recovery ventilation

209

- ▶ Dwelling units shall be provided with a heat recovery or energy recovery ventilation system in Climate Zones 7 and 8. The system shall be balanced with a minimum sensible heat recovery efficiency of 65 percent at 32°F at a flow greater than or equal to the design airflow.



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N1103.6.2 (R403.6.2) Whole-dwelling mechanical ventilation system fan efficacy

210

- ▶ Fans used to provide whole-dwelling mechanical ventilation shall meet the efficacy requirements of Table N1103.6.2 at one or more rating points.
- ▶ Fans shall be tested in accordance with HVI 916 and listed.
- ▶ The airflow shall be reported in the product listing or on the label.



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N1104.1 (R404.1) Lighting equipment

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- ▶ All permanently installed lighting fixtures, excluding kitchen appliance lighting fixtures, shall contain only high-efficacy lighting sources.



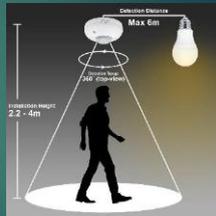
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N1104.2 (R404.2) Interior lighting controls

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- ▶ Permanently installed lighting fixtures shall be controlled with a dimmer, an occupant sensor control or another control that is installed or built into the fixture.
 - ▶ Exception: Lighting controls shall not be required for the following:
 - ▶ 1. Bathrooms.
 - ▶ 2. Hallways.
 - ▶ 3. Exterior lighting fixtures.
 - ▶ 4. Lighting designed for safety or security.



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N1104.3 (R404.3) Exterior lighting controls

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- ▶ Where the total permanently installed exterior lighting power is greater than 30 watts, the permanently installed exterior lighting shall comply with the following:
 - ▶ 1. Lighting shall be controlled by a manual on and off switch that permits automatic shut-off actions.

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N1104.3 (R404.3) Exterior lighting controls



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

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N1108 (R408) Additional efficiency package options

- ▶ This section establishes additional efficiency package options to achieve additional energy efficiency in accordance with Section N1101.13.5.



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N1108.2.1 (R408.2.1) Enhanced envelope performance option



- ▶ The total building thermal envelope UA, the sum of U-factor times assembly area, shall be less than or equal to 95 percent of the total UA, resulting from multiplying the U-factors in Table N1102.1.2 by the same assembly area as in the proposed building.
- ▶ The UA calculation shall be performed in accordance with Section N1102.1.5.
- ▶ The area-weighted average SHGC of all glazed fenestration shall be less than or equal to 95 percent of the maximum glazed fenestration SHGC in Table N1102.1.2.

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N1108.2.2 (R408.2.2) More efficient HVAC equipment performance option

- ▶ Heating and cooling equipment shall meet one of the following efficiencies:
 - ▶ 1. Greater than or equal to 95 AFUE natural gas furnace and 16 SEER air conditioner.
 - ▶ 2. Greater than or equal to 10 HSPF/16 SEER air source heat pump.



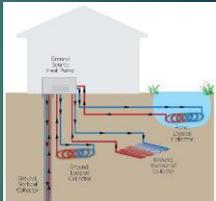
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N1108.2.2 (R408.2.2) More efficient HVAC equipment performance option

- ▶ 3. Greater than or equal to 3.5 COP ground source heat pump. For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in this section and shall be sized to serve 100 percent of the cooling design load. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in this section and shall be sized to serve 100 percent of the heating design load.



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N1108.2.3 (R408.2.3) Reduced energy use in service water-heating option

- ▶ The hot water system shall meet one of the following efficiencies:
 - ▶ 1. Greater than or equal to 82 EF fossil fuel service water-heating system.
 - ▶ 2. Greater than or equal to 2.0 EF electric service water-heating system.
 - ▶ 3. Greater than or equal to 0.4 solar fraction solar water-heating system.



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N1108.2.4 (R408.2.4) More efficient duct thermal distribution system option

- ▶ The thermal distribution system shall meet one of the following efficiencies:
 - ▶ 1. 100 percent of ducts and air handlers located entirely within the building thermal envelope.
 - ▶ 2. 100 percent of ductless thermal distribution system or hydronic thermal distribution system located completely inside the building thermal envelope.
 - ▶ 3. 100 percent of duct thermal distribution system located in conditioned space as defined by Section N1103.3.2.

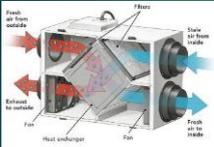


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N1108.2.5 (R408.2.5) Improved air sealing and efficient ventilation system option



- ▶ The measured air leakage rate shall be less than or equal to 3.0 ACH50, with either an Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV) installed.
- ▶ Minimum HRV and ERV requirements, measured at the lowest tested net supply airflow, shall be greater than or equal to 75 percent Sensible Recovery Efficiency (SRE), less than or equal to 1.1 cubic feet per minute per watt and shall not use recirculation as a defrost strategy.
- ▶ In addition, the ERV shall be greater than or equal to 50 percent Latent Recovery/Moisture Transfer (LRMT).

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New Appendix Chapters

- ▶ Appendix AU
 - ▶ Cob Constructions
- ▶ Appendix AV
 - ▶ Board of Appeals
- ▶ Appendix AW
 - ▶ 3D-Printed Buildings



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