

# Substantiating Documents for Public Comments Received on 2024 NGBS Draft 2

June 5, 2024

## Contents

PC217 - 505.12 Wildfire resilience

PC245 - 902.3 Radon testing and mitigation

PC264 - Chapter 11 - Overall

PC278 - APPENDIX D: WATER RATING INDEX

PC217- 505.12 Wildfire resilience



# How To Prepare Your Home for an Evaluation

The Wildfire Prepared Home designation program enables homeowners to take preventative measures for their home and yard to protect against wildfire. This checklist will guide you through required actions to help protect your home and receive a designation certificate.

## Eligibility

- The applicant must be the owner of the 3-story or less, single-family detached home (no townhomes or condos).
- The home must be located in California.
- A 5-foot noncombustible buffer must surround the home. Photos submission are required for eligibility.

### NOTE:

- Designation certificate requirements are stringent. Tree requirements may disqualify some homes, and some homeowners may have to work with neighbor(s) to meet the requirements.
- One of the most stringent required actions is creating a 5-foot noncombustible buffer around your home and decks. **ALL** vegetation, trees including overhanging branches, grass/turf, wood/rubber mulch, wood/vinyl fencing, and any stored items within 5 feet of your home must have been removed. Your home will not receive the designation certificate without meeting the requirements.

## Examples of eligible homes with a 5-foot noncombustible buffer



## Designation Certificate Levels

We offer two solutions. To receive a designation certificate, your home must meet **all** requirements listed for the desired level.

1. **Wildfire Prepared Home Base** — This group of required actions includes creating a 5-foot home buffer, preparing the home’s exterior, and maintaining the deck/covered porch and yard, **typically achieved through retrofits** to existing homes.
2. **Wildfire Prepared Home Plus** — This group of required actions builds upon *Wildfire Prepared Home Base* to add an extra layer of home protection, **commonly achieved with newer home construction** or after exterior home renovations.

## Process & Timing

<b>Step 1:</b>	<b>DIY PREP:</b> Homeowner completes work using this How-To Prepare Your Home Checklist.	<b>Timing:</b> Weeks to months, depending on the extent of the work required.
<b>Step 2:</b>	<b>PAY &amp; SUBMIT:</b> Pay \$125 nonrefundable, application fee and submit eligibility photos.	<b>Timing:</b> 5-10 minutes.
<b>Step 3:</b>	<p><b>EVALUATION:</b> A 3<sup>rd</sup> party evaluator will document areas where the work is complete.</p> <p><i>Note: They do not attempt to inspect/document every deficiency to tell a homeowner what to do. The designation is an owner driven process, so it is the homeowner's responsibility to follow the guidance and mitigate their house.</i></p>	<b>Timing:</b> Typically, evaluations occur 30+ days. This can fluctuate based on location, weather, and # of applicants.
<b>Step 4:</b>	<b>QA REVIEW:</b> Experts will conduct a thorough review to determine the designation certificate level achieved.	<b>Timing:</b> One to two weeks.
<b>Step 5:</b>	<b>DESIGNATION:</b> If the home meets all requirements, you will be notified via email with a certificate. If there is more work to complete, you will have 90 days to complete the work and submit photos.	<b>Timing:</b> Within one week.

NOTE: If there are additional required actions to be completed after an evaluation, the full process can take 60+ days.

## Maintenance & Renewal

### Annual Review

- Once a designation certificate has been issued, an annual maintenance review is required. This ensures vegetation doesn't creep into the 5-foot noncombustible buffer and crucial upkeep of vegetation is maintained within 5-30 feet.
- We offer 2 solutions:
  - Self-evaluation with photos provided by the homeowner for \$25.
  - 3<sup>rd</sup> party exterior home evaluation for \$100.

### 3-Year Recertification

- After 3 years, recertification is required to keep the designation certificate active. Homeowners can use their portal log in to apply for a new home evaluation to verify program requirements have been maintained.

## Definitions

Within this standard, acceptable products and materials are those listed by the California State Fire Marshal or in a current report issued by an approved agency (accredited to ISO 17065) to meet one of the following test standards:

- Noncombustible** – Made from material of which no part will ignite and burn when subjected to fire. Any material passing ASTM E136 is considered noncombustible.
- Ignition-resistant** – A type of building material that resists ignition or sustained flaming combustion sufficiently to reduce losses from wildland-urban interface conflagrations under worst-case weather and fuel conditions with wildfire exposure of embers and small flames. Ignition-resistant building materials must comply with one of the following:
  - Extended ASTM E84 (UL 723) test or ASTM E2768
  - Noncombustible material

NOTE: An ignition-resistant material should not be confused with ignition-resistant construction as ignition-resistant construction can include combustible materials in the assembly, and inclusion of combustible materials in the assembly does not comply with the Wildfire Prepared Home Plus designation standard.

# Wildfire Prepared Home Base Designation

To receive a designation certificate, your home must meet all requirements listed for this level. This group of required actions includes creating a 5-foot home buffer, preparing the home's exterior, and maintaining the deck/covered porch and yard, **typically achieved through retrofits to existing homes.**

## CREATE A 5-FOOT HOME BUFFER

### 1. Create a 5-foot noncombustible buffer around your home and decks.

#### Remove ALL vegetation, trees including overhanging branches, grass/turf, wood/rubber mulch, and any stored items within 5 feet.

- Remove all vegetation and combustible ground covers such as mulch within 5 feet of your home.
- Trim back branches that overhang the 5-foot area; the home buffer extends to the sky.
- Do not allow vines to grow on buildings, fences, or within 5 feet of the building.
- Install 5 feet of hard groundcover material such as bare dirt, gravel, pavers, river rocks, DG base, steppingstones, or concrete including the 5 feet surrounding decks/covered porches, under and around the stairs.

**Tips:** Use a measuring tape from the base of the walls and deck to measure out to 5 feet. If you have a covered porch, it should be measured out to 5 feet from the cover, including vertical supports that hold up the structure. Some homeowners may have to work with neighbor(s) to meet the requirements of this 5-foot buffer zone.

#### Replace combustible fencing within 5 feet.

- Replace any wood/vinyl fencing, posts, and gates located within 5 feet of the home with a noncombustible fence, such as metal (aluminum or chain link).

#### Maintain the 5-foot noncombustible buffer area regularly.

- Routinely clear tree debris, weeds, grass, and dead plant material.
- Do not park or store any vehicles, boats, RVs, trailers, or ATVs within 5 feet of the home. Ideally, store these items in a closed garage or park them at least 30 feet away from the home.
- Do not store anything combustible such as firewood, potted plants, outdoor furniture, trash cans, pet houses, lawn tools, sheds, hot tubs, or children's playsets, in this zone.

## PREPARE YOUR HOME

### 2. Check and maintain your roof and gutters.

- Regularly clear all tree debris from your roof and gutters.
- Replace a wood shake/shingle roof with a Class A fire-rated roof cover such as asphalt shingles, tile, slate, or metal roofs. Tile and some metal must also include bird stops at the edges, to prevent intrusion under the tile by birds or other wildlife.
- Replace plastic or vinyl gutters with metal gutters such as aluminum or steel.



*During a wildfire, embers can travel miles ahead of a fire front and accumulate at the base of your home's exterior walls and within the first 5 feet. By implementing a buffer zone, you significantly reduce the chances of your home being ignited by wildfire.*



*Combustible fences when ignited can provide a pathway for fire to reach your home.*

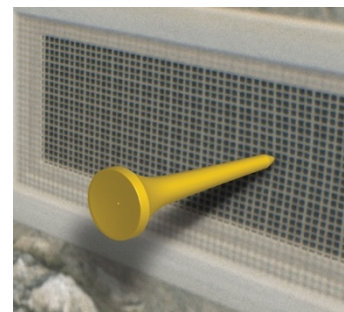
### 3. Install ember-resistant vents.

- Install ember-resistant vents or cover all existing vents with 1/8-inch metal wire mesh.
- Ensure your dryer vent has a louver or flap to reduce ember entry. Due to its design and function, wire mesh should not be used on dryer vents.

*Note: Plumbing vents are excluded from these requirements.*

#### Vent Tips

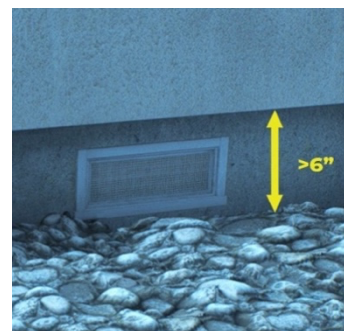
- o Check your current vent mesh size using a golf tee or the tip of a pen. If the tee does not fit through the mesh openings, it is the correct size.
- o You can cover your current vents by installing the 1/8-inch metal mesh from the inside or outside.



*Wind-blown embers can enter your home through vents in your attic, roof, gables, and crawlspace and ignite materials inside.*

### 4. Ensure a 6-inch vertical clearance on exterior walls.

- Ensure there is a minimum of 6 vertical inches (measured from the ground up and from any attached horizontal surface like a deck) of noncombustible siding material around your home, such as fiber-cement, brick, stone, stucco, or exposed concrete foundation.



*Embers accumulate against homes at the base of exterior walls and on other horizontal surfaces like decks that can ignite the home.*

## MAINTAIN DECKS & YARD 5 TO 30 FEET

### 5. Clear and maintain decks and covered porches.

#### On top of the deck or on the porch:

- Regularly clear all tree debris.
- Remove large rugs and combustible wood, wicker, or plastic furniture.
- Only include noncombustible cast aluminum or metal furniture and up to 10 noncombustible terra cotta or ceramic planters (with small flowers or plants, no woody vegetation, or trees).
- Ensure items like cushions or door mats are small enough to easily be moved inside on Red Flag days.
- Hot tubs on a noncombustible patio must be 10 feet from the home. Remove hot tubs from underneath a covered porch and combustible decks.

#### Underneath the deck:

- Remove anything stored under the deck or stairs.
- Remove all vegetation—including grass or weeds—from under the deck and stairs.
- Include a 5-foot noncombustible buffer around deck and stairs.
- Additionally, for decks with a walking surface at a height of 4 feet or less from the ground, enclose the area underneath with one of the following:



For low decks, enclose the area underneath to keep debris and embers out which can easily ignite a deck from underneath.

- Install 1/8-inch or finer metal wire mesh around the outer edge of the walking surface extending to the ground, **or**
- Install a noncombustible wall covering.



*Decks attached to or built near your home provide a path for fire to reach your home. Reducing or eliminating the vulnerabilities of a deck or porch—including items on top of or underneath—reduces the chance your home ignites.*

**For decks with an additional structure (like a pergola, gazebo, or hot tub), the following must be met:**

- Remove combustible structures such as a pergola or gazebo from decks or replace with noncombustible material such as metal.
- Remove hot tubs from combustible decks.
- Remove all vegetation such as vines and any curtains/drapes/screens.

*Note: Detached decks within 30 feet of the home must meet the same requirements as attached decks.*

**6. Maintain the yard, trees, and structures from 5 to 30 feet.**

**Maintain the yard**

- Cut grass to no more than 4 inches and keep watered.
- Routinely clear tree debris such as leaves and pine needles.
- Remove dead vegetation, including piles from pruning. Firewood should be stored 30 feet from any structures.

**Trim trees**

- Remove tree branches less than 6 feet above the ground.
- Trim upper branches of trees to ensure at least 10 feet of space between the canopies of neighboring trees.

**Shrubs**

- Choose low-growing, fire-resistant plants.
- Relocate any shrubs located under or near trees.
- Keep low-growing bushes and shrubs spaced apart or in small groupings (no more than 3 shrubs or a maximum of 10 feet wide and 10 feet apart from other plantings) that will result in a discontinuous path of vegetation.
- Remove any hedges or rows of bushes that will create more fuel and a pathway for fire to reach your home.

**Maintain structures within 30 feet of your home (i.e., sheds, hot tubs, pergolas, and playsets)**

- Place structures **at least 10 feet away** from the home or any attached decks.
- Create a 5-foot noncombustible buffer around and under each structure.
- Clear all vegetation such as vines growing on and tree branches overhanging these structures.
- Ensure there is a minimum of 6 vertical inches (measured from the ground) of noncombustible siding material at the base of each structure or any horizontal surfaces, such as a hot tub, just as you would for your home. For an elevated structure like a shed, enclose the base with no larger than 1/8-inch or finer metal wire mesh.
- If you have multiple structures, such as a shed, hot tub, and playset, ensure these structures are spaced at least 10 feet apart. Have at most 3 of these structures within 30 feet of your home.
- Move large stationary propane tanks to 30 feet away from the home. If there is not an option to move the tank 30 feet from your home, it should be placed a minimum of 10 feet from the home and one of the following:
  - Buried underground.
  - Enclosed on all 4 sides with concrete block, 1/8-inch mesh over the top for ventilation, and 5-feet of noncombustible groundcover surrounding the structure.\*  
\*This is a suggestion, retrofit in coordination with your propane provider.

Note: Best practice is to place structures 30+ feet away from your home. To meet the Plus level designation, it is required to have all structures placed at least 30 feet from the home.

## How-to Prepare Your Home Checklist

# Wildfire Prepared Home Plus Designation

This group of actions builds upon *Wildfire Prepared Home Base* to add an extra layer of home protection, commonly achieved with newer home construction or after exterior home renovations. To receive a designation certificate for Plus, your home must meet all requirements listed for Wildfire Prepared Home Base **plus all** the following additional requirements.

Note: The exception is for *structures*. To meet the Plus level designation, it is required to have all structures placed at least 30 feet from the home or have them removed completely.

## UPGRADE YOUR HOME'S EXTERIOR

### 1. Enclose underside of eaves.

- Install noncombustible or ignition-resistant soffit material, such as fiber-cement board or 2-inch nominal or thicker lumber.
- NOTE: If venting the enclosed eaves, soffit vents should be ember-resistant or include 1/8-inch or finer metal wire mesh.

### 2. Cover gutters.

- Install noncombustible gutter guards to keep tree debris out.

### 3. Install a noncombustible dryer vent.

- Install a metal dryer vent, which includes louvers or a flap.

### 4. Move structures 30 feet from your home (*i.e., sheds, hot tubs pergolas, and playsets*).

- Move structures at least 30 feet away from your home or remove them completely.

### 5. Upgrade windows and doors.

#### Windows:

- Replace all exterior windows with tempered, multipaned glass (at least 2 panes tempered) or fire-resistant glass blocks.
- Replace domed, plastic skylights with flat, multipaned, tempered glass skylights.

#### Doors:

- Upgrade to solid exterior doors that have a metal threshold and are constructed with a noncombustible or ignition-resistant material such as metal, fiberglass, or solid hardwood.
- If you choose a door that includes glass, make sure it is made with tempered, multipaned glass.
- Alternatively, install a noncombustible storm door to cover the existing door. These are fire-resistant.

### 6. Install noncombustible siding and shutters.

- Replace combustible or ignition-resistant constructed siding that includes wood, engineered wood-fiber, or vinyl siding with a noncombustible or ignition-resistant material such as fiber-cement board, stucco, brick, metal, or stone veneer.
- Replace combustible decorative shutters, with noncombustible shutters.



Because of their geometry, radiant heat can build up in an open eave and ignite exposed materials. Flames from nearby fuels such as a shed or vegetation can also ignite eaves.



During a wildfire, windows and doors are susceptible to heat and flames. Upgrading windows and doors can help keep flames from entering and igniting materials inside the home.



## 7. Enclose under bay windows.

- Enclose any open area underneath a ground floor bay window with an exterior wall and noncombustible siding.

## 8. Build or retrofit to a noncombustible deck.

*Note: Composite decking, plastic, fire retardant treated (FRT) wood, and dense hardwoods do not comply with the Wildfire Prepared Home **Plus** designation requirements.*

### **When building a new deck:**

- Construct all deck components with noncombustible materials and a solid walking surface.**

#### **Example materials:**

- Steel joists.
- Solid walking surface using lightweight concrete, autoclaved aerated concrete (AAC), tile, stone, or aluminum (made to look like wood).
- Railings using steel cable, steel rod, aluminum (made to look like wood), wrought iron, or glass.
- Stairs using steel risers with a solid walking surface using lightweight concrete, autoclaved aerated concrete (AAC), tile, stone, brick, or aluminum (made to look like wood).

### **When retrofitting an existing deck:**

(See noncombustible material examples above)

- Ensure the bottom 6 inches of deck posts and stairs are noncombustible.
- Replace the walking surface with a solid (no gap), noncombustible walking surface.
  - Decks with a walking surface at a height of 4 feet or less from the ground must be enclosed underneath with a noncombustible material such as 1/8-inch or finer metal mesh.
- Install noncombustible railings within the first 5 feet attached to the home.
- Replace the stair treads with a solid (no gaps), noncombustible walking surface.
  - Use the same noncombustible material as the walking surface with closed risers (back of walking surface).
  - Clear underneath stairs wider than 4 feet and enclose with noncombustible material such as 1/8-inch or finer metal mesh.

## 9. Remove back-to-back fencing.

- If you and your neighbor(s) have separate, parallel fences that are less than 5 feet apart, work with your neighbor to remove any sections of back-to-back fencing within 30 feet of the home.

# WUIC61-24

IWUIC: [A] 106.6, SECTION 202 (New), SECTION 202, 603.2.1, 604.2, 604.3, A102.2, A104.4, A104.7.1, A105.4.2, A106.2, A107.3, APPENDIX F, F101.1, G101.3.1

**Proponents:** Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

## 2024 International Wildland Urban Interface Code

**Revise as follows:**

**[A] 106.6 Other data and substantiation.** Where required by the *code official*, the plans and specifications shall include classification of fuel loading, fuel model light, medium or heavy, and substantiating data to verify classification of ~~fire-resistant vegetation~~ fire-smart vegetation.

**Add new definition as follows:**

**FIRE-SMART VEGETATION.** Plants, shrubs, trees and other vegetation that exhibit properties, such as high moisture content, little accumulation of dead vegetation and low sap or resin content, that make them less likely to ignite or contribute heat or spread flame in a fire than native vegetation typically found in the region.

**Revise as follows:**

**FUEL MODIFICATION.** A method of modifying fuel load by reducing the amount of ~~nonfire-resistant~~ vegetation or altering the type of vegetation to reduce the fuel load.

**603.2.1 Responsible party.** Persons owning, leasing, controlling, operating or maintaining buildings or structures requiring *defensible spaces* are responsible for modifying or removing ~~nonfire-resistant vegetation~~ other than fire-smart vegetation on the property owned, leased or controlled by said person.

**604.2 Modified area.** ~~Nonfire-resistant vegetation~~ Vegetation other than fire-smart vegetation or growth shall be kept clear of buildings or structures, in accordance with Section 603, in such a manner as to provide a clear area for fire suppression operations.

**604.3 Responsibility.** Persons owning, leasing, controlling, operating or maintaining buildings or structures are responsible for maintenance of *defensible spaces*. Maintenance of the *defensible space* shall include modifying or removing ~~nonfire-resistant~~ vegetation other than fire-smart vegetation and keeping leaves, needles and other dead vegetative material regularly removed from roofs of buildings and structures.

**A102.2 Clearance of brush or vegetative growth from roadways.** The *code official* is authorized to require areas within 10 feet (3048 mm) on each side of portions of fire apparatus access roads and driveways to be cleared of ~~nonfire-resistant~~ vegetation growth other than fire-smart vegetation.

**Exception:** Single specimens of trees, ornamental vegetative fuels or cultivated ground cover, such as green grass, ivy, succulents or similar plants used as ground cover, provided they do not form a means of readily transmitting fire.

**A104.4 Smoking.** Where required by the *code official*, signs shall be posted stating NO SMOKING. Persons shall not smoke within 15 feet (4572 mm) of combustible materials or ~~nonfire-resistant~~ vegetation other than fire-smart vegetation.

**Exception:** Places of habitation or in the boundaries of established smoking areas or campsites as designated by the *code official*.

**A104.7.1 General.** Persons shall not build, ignite or maintain any outdoor fire of any kind for any purpose in or on any *wildland-urban interface area*, except by the authority of a written permit from the *code official*.

**Exception:** Outdoor fires within inhabited premises or designated campsites where such fires are in a permanent barbecue, portable barbecue, outdoor fireplace, incinerator or grill and are not less than 30 feet (9144 mm) from any combustible material or ~~nonfire-resistant~~ vegetation other than fire-smart vegetation.

**A105.4.2 Separation.** A clear space of not less than 40 feet (12 192 mm) shall be provided between piles. The clear space shall not contain combustible material or nonfire-resistive vegetation.

**Revise as follows:**

**A106.2 Ashes and coals.** Ashes and coals shall not be placed, deposited or dumped in or on *wildland-urban interface areas*.

**Exceptions:**

1. In the hearth of an established fire pit, camp stove or fireplace.
2. In a noncombustible container with a tightfitting lid, which is kept or maintained in a safe location not less than 10 feet (3048 mm) from ~~nonfire-resistive vegetation or structures~~ and vegetation other than fire-smart vegetation.
3. Where such ashes or coals are buried and covered with 1 foot (305 mm) of mineral earth not less than 25 feet (7620 mm) from ~~nonfire-resistive vegetation or structures~~ and vegetation other than fire-smart vegetation.

**A107.3 Fuel modification area.** Water storage and pumping facilities shall be provided with a *defensible space* of not less than 30 feet (9144 mm) clear of ~~nonfire-resistive vegetation or growth~~ vegetation other than fire-smart vegetation around ~~and adjacent to~~ such facilities.

Persons owning, controlling, operating or maintaining water storage and pumping systems requiring this *defensible space* are responsible for clearing and removing ~~nonfire-resistive vegetation~~ other than fire-smart vegetation and maintaining the *defensible space* on the property owned, leased or controlled by said person.

## **APPENDIX F**

# **CHARACTERISTICS OF FIRE-RESISTIVE VEGETATION FIRE-SMART VEGETATION**

**F101.1 Characteristics of ~~fire-resistive vegetation~~ fire-smart vegetation.** All plants will burn under extreme fire weather conditions, such as drought. However, plants burn at different intensities and rates of consumption. ~~Fire-resistive plants burn~~ Fire-smart vegetation burns at a relatively low intensity, slow rates of spread and with short flame lengths. The following are characteristics of ~~fire-resistive vegetation~~ fire-smart vegetation:

1. Growth with little or no accumulation of dead vegetation (either on the ground or standing upright).
2. Non-resinous plants (willow, poplar or tulip trees).
3. Low volume of total vegetation (for example, a grass area as opposed to a forest or shrub-covered land).
4. Plants with high live fuel moisture (plants that contain a large amount of water in comparison to their dry weight).
5. Drought-tolerant plants (deeply rooted plants with thick, heavy leaves).
6. Stands without ladder fuels (plants without small, fine branches and limbs between the ground and the canopy of overtopping shrubs and trees).
7. Plants requiring little maintenance (slow-growing plants that, when maintained, require little care).
8. Plants with woody stems and branches that require prolonged heating to ignite.

**G101.3.1 Exterior sprinkler systems.** Currently, there is no nationally accepted standard for the design and installation of exterior fire sprinkler systems. Interior sprinkler systems are regulated by nationally recognized standards that have specific requirements. However, exterior sprinkler systems lack such uniformity. What is generally proposed is a type of sprinkler system, placed on the roofs or eaves of a building, whose primary purpose is to wet down the roof. These types of systems can be activated either manually or automatically. However, the contemporary thought on exterior sprinkler systems is that if the roof classification is of sufficient fire resistance, exterior sprinklers are of little or no value. Another option and alternative with exterior sprinklers is to use them to improve the relative humidity and fuel moisture in the *defensible space*. In this case, the exterior sprinkler is not used to protect the structure as much as it attempts to

alter the fuel situation. However, studies do not support the idea that merely spraying water into the air in the immediate vicinity of a rapidly advancing wildland-urban fire does much good. Clearly, irrigation systems that keep plants healthy and ~~fire-resistant plants~~ fire-smart vegetation that resist convection and radiated heat can accomplish the same purpose.

**Reason:** The term “fire-resistive vegetation” is a misnomer. All vegetation will burn. The IWUIC already uses the term of “ignition-resistant construction” which is applicable to construction features, not vegetation.

Since there are no fire-resistant plants, the term misleads the code user and can be misapplied. To add clarity and so that the term does not create confusion, “fire-resistive vegetation” is proposed to be replaced with “fire-smart vegetation.” This term is clear and does not imply that the vegetation will not burn.

To assist with the new term, a definition is added which addresses the characteristics that are crucial for fire-smart vegetation. In the definition of “fuel modification”, the term “non-fire-resistive” is intentionally not included because the vegetation that is modified could be fire-smart vegetation or vegetation other than fire-smart vegetation. There are situations where even fire-smart vegetation needs to be modified or trimmed or removed. This revised definition of “fuel modification” means that it applies to all types of vegetation.

**NOTE:** The proposal to create a new Chapter 7 for all maintenance requirements would delete Section 603.2.1 (Responsible party).

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the [FCAC Website](#)

**Bibliography:** <https://anrcatalog.ucanr.edu/pdf/8228.pdf>  
<https://www.firefree.org/wp-content/uploads/2016/02/Fire-Resistant-Plants.pdf>

**Cost Impact:** The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

**Justification for no cost impact:**

Changing the term of "fire-resistive vegetation" to the more correct term of "fire-smart vegetation" is editorial and has no regulatory impact.

# Proposals (CAH1)

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Agenda Number



Groups

Status

Hearing Committees

Proponent

Subject Matter

**1 Proposal (CAH1)**Sort by 

ID	Agenda Number	Status	Proponent	Submitted At	Attachments	Committee Action	PCH Action
10036	WUIC61-24	Submitted	Robert Marshall	8 Jan 2024 - 1:30 PM EST		As Submitted	None

[← Previous](#)**1**[Next →](#)

# WILDFIRE HOME RETROFIT GUIDE

How to Harden Homes  
Against Wildfire



LIVING  
WITH FIRE  
TAHOE



EXTENSION

College of Agriculture,  
Biotechnology & Natural Resources

PEER  
REVIEWED

# How to Use This Guide



This Guide includes specific recommendations for how to retrofit existing components of a home to withstand wildfire. Each section contains an explanation of how the component is vulnerable to wildfire and what can be done to improve that component. The illustrations throughout the Guide are intended to show best practices for reducing the vulnerability of a home to wildfire.

## Inside This Guide

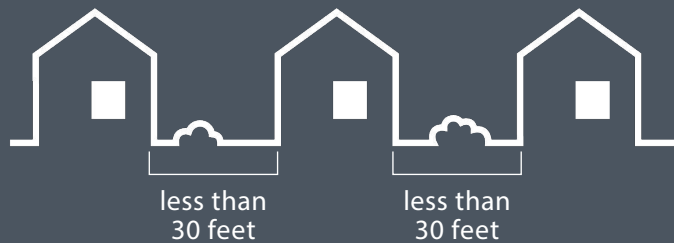
Defensible Space	p. 5	Siding	p. 10	Chimneys	p. 15
Roofs	p. 6	Skylights	p. 11	Fences	p. 16
Roof Edges	p. 7	Windows	p. 12	Glossary	p. 17
Rain Gutters	p. 8	Decks	p. 13	Online Resources	p. 18
Vents	p. 9	Garages	p. 14		

**When using this Guide, think about the location and context of the home and how that influences vulnerability to wildfire:**



## **Steep Slopes**

When homes are located on steep slopes, decks commonly overhang the slope below, and this downslope area is often heavily vegetated. Prioritize defensible space actions so that flames from burning vegetation cannot reach the underside of the deck and ignite, with subsequent ignition of the home.



## **Dense Neighborhoods**

Dense neighborhoods with homes close together have an increased risk of building to building ignition because of the radiated heat and potential flames that are generated if a neighbor's home burns. Prioritize actions to reduce the possibility of homes igniting each other. Intensify defensible space by thinning trees and shrubs between homes. Engage in neighborhood conversations to encourage all neighbors to take actions to reduce their own vulnerability to wildfire.



## **Large-Parcel Lots**

When homes are on large parcel lots and neighboring homes are far apart, vegetation and other combustible materials on the property (e.g., wood pile, tool shed) can be a large factor in home ignition. Prioritize creating and maintaining defensible space, including the near-home noncombustible zone, and home-hardening techniques to reduce vulnerability from embers.



## Living within the natural environment brings both serenity and responsibility.

Communities located in wildfire-prone areas need to take extra measures to live safely. There are many ways to prepare communities and properties for wildfire, including creating and maintaining adequate defensible space and hardening homes through altering or replacing the construction components. This guide will help residents and building professionals better understand how to prepare homes and communities for wildfire.



**DURING A WILDFIRE,** homes can be threatened by **1)** wind-blown embers, **2)** radiant heat, and **3)** direct flame contact.

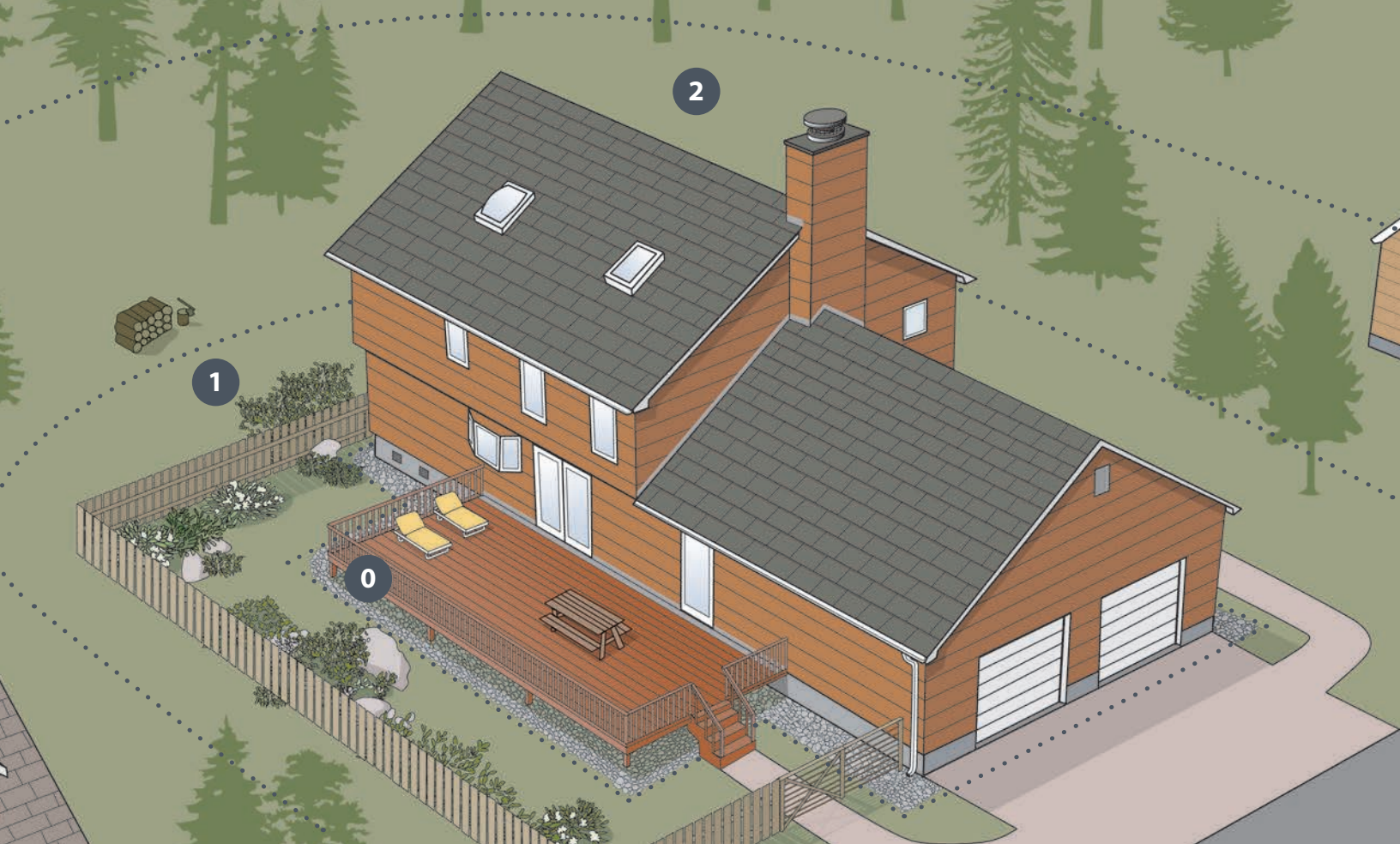
In wildfire events, 60-90% of home loss is due to embers. Embers can originate from an approaching wildfire or small parts of nearby burning vegetation and construction materials (e.g., a home, storage shed, wood pile). Embers are important because of what they can do directly (e.g., ignite materials in an attic after entering through a vent) and what they can do



indirectly (e.g., ignite a wood pile or storage shed located close to the home, resulting in radiant heat or direct flame contact to the side of the home). Reducing the vulnerability of homes to ember ignition will increase the chance of homes and neighborhoods surviving a wildfire.

The most effective way for homes to withstand wildfire is a “coupled approach” that considers the exterior

construction materials and how they are put together, as well as the surrounding vegetation and other near-home combustible materials. Selection, location and maintenance of vegetation and other combustible materials on a property can reduce the chance of a wildfire burning the home. This Guide provides information and recommendations for retrofitting an existing or newly constructed home with wildfire in mind.



↑ *Protecting a home from wildfire requires continual defensible space actions in three zones around the property.*

Contact local Extension offices for more information about defensible space recommendations specific to different regions.

## Defensible Space

- 0 THE EMBER-RESISTANT ZONE (Zone 0) | 0–5 feet:** The zone within 5 feet of your home has many different names (e.g., the noncombustible zone, the immediate zone, the zero zone), but the objective is generally the same—to reduce the vulnerability of the home to embers by creating a zone of ember-resistant materials around the home. Gravel, a concrete or brick walkway, or another hardscape feature is commonly used to construct this zone. This ember-resistant zone should include the area under and around any attached deck. Be sure to keep this zone clean of any woodpiles, wood mulch, or flammable vegetation.
- 1 THE LEAN, CLEAN AND GREEN ZONE (Zone 1) | 5–30 feet:** The objective of this zone is to reduce the risk of fire spreading from surrounding vegetation to the home. Lean indicates that there is only a small amount of vegetation, if any, present. Vegetation should be grouped in discontinuous islands. Clean indicates that vegetative debris and dead materials are routinely removed. Green indicates that vegetation within this zone is kept green and well irrigated (if appropriate) during the fire season.
- 2 THE REDUCED FUEL ZONE (Zone 2) | 30–100 feet:** The objective of this zone is to reduce fire spread and restrict fire movement into the crowns of trees or shrubs. Remove dead plant material, lower tree branches and other ladder fuels (e.g., shrubs, lower branches, smaller trees). Locate outbuildings (e.g., for storage) at least 30 feet away from the home and create an ember-resistant zone around all outbuildings and propane tanks.

# Roofs

Making a roof “fire-safe” is a big step in reducing the vulnerability of the home to wildfire. There are three fire ratings for roof coverings: Class A, Class B and Class C, with Class A providing the greatest fire protection. The roof rating designation provides information for the roof covering material and does not include where the roof meets other materials at the edge of the roof. A non-fire-retardant treated wood shake or shingle roof covering is unrated and is not desirable—these roof types have less than a Class C rating.

## HOW TO REDUCE THE VULNERABILITY OF ROOFS

- ▶ Replace a wood shake or shingle roof with a Class A roof.
- ▶ Remove accumulated vegetative debris from the roof.
- ▶ If there is a space between the roofing materials and roof deck, make sure that the openings between the covering and the roof deck are blocked. Repair areas as needed.
- ▶ If the roof consists of Class B or C roofing materials, determine if the underlayment in the assembly provides Class A protection as indicated in manufacturer installation instructions. When viewed from the edge of the roof, these materials would either look like gypsum wallboard or overlapping 4-foot wide sections of an asphalt composition roof covering. Maintain the roof covering and replace with a Class A product when needed.

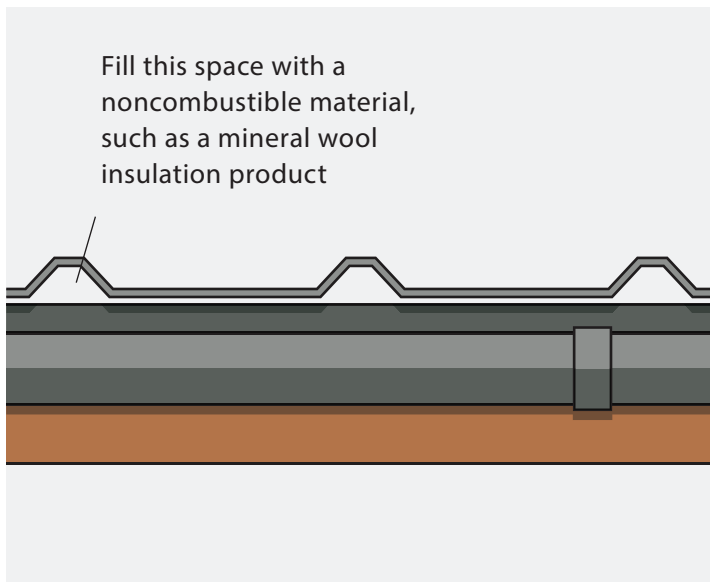
**A CLASS A ROOFING** materials include asphalt fiberglass composition shingles, clay and cementitious tiles (both flat and barrel shaped), and some metal roofing materials.

**B CLASS B ROOFING** materials are most commonly exterior-rated, pressure-impregnated fire-retardant treated shake or shingle covering (not allowed for use in many jurisdictions).

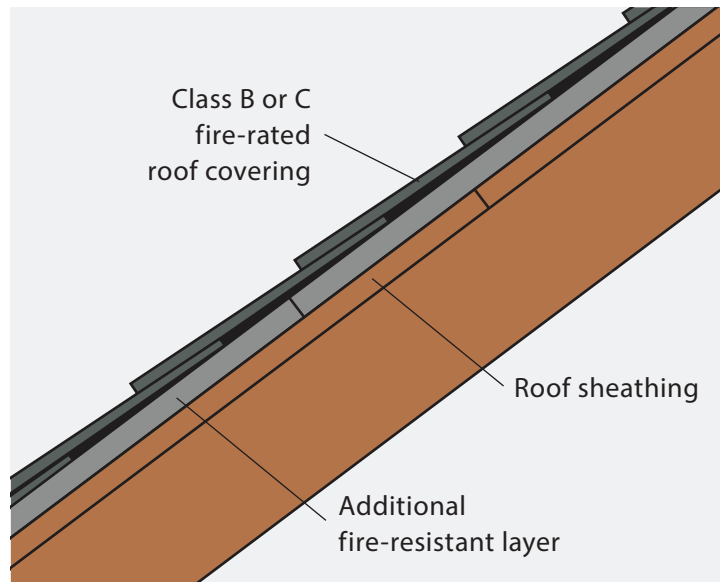
**C CLASS C ROOFING** materials include recycled plastic, rubber and aluminum.

*Class B and Class C roofing materials can have a Class A “by assembly” rating. In these cases, additional materials that enhance the fire resistance of the roof assembly (i.e., the roofing material plus other materials included in the roof assembly) must be installed. In these cases, be sure to follow the manufacturer’s instructions.*

## METAL ROOF



## CLASS A “BY ASSEMBLY” FIRE-RATED ROOF COVERING

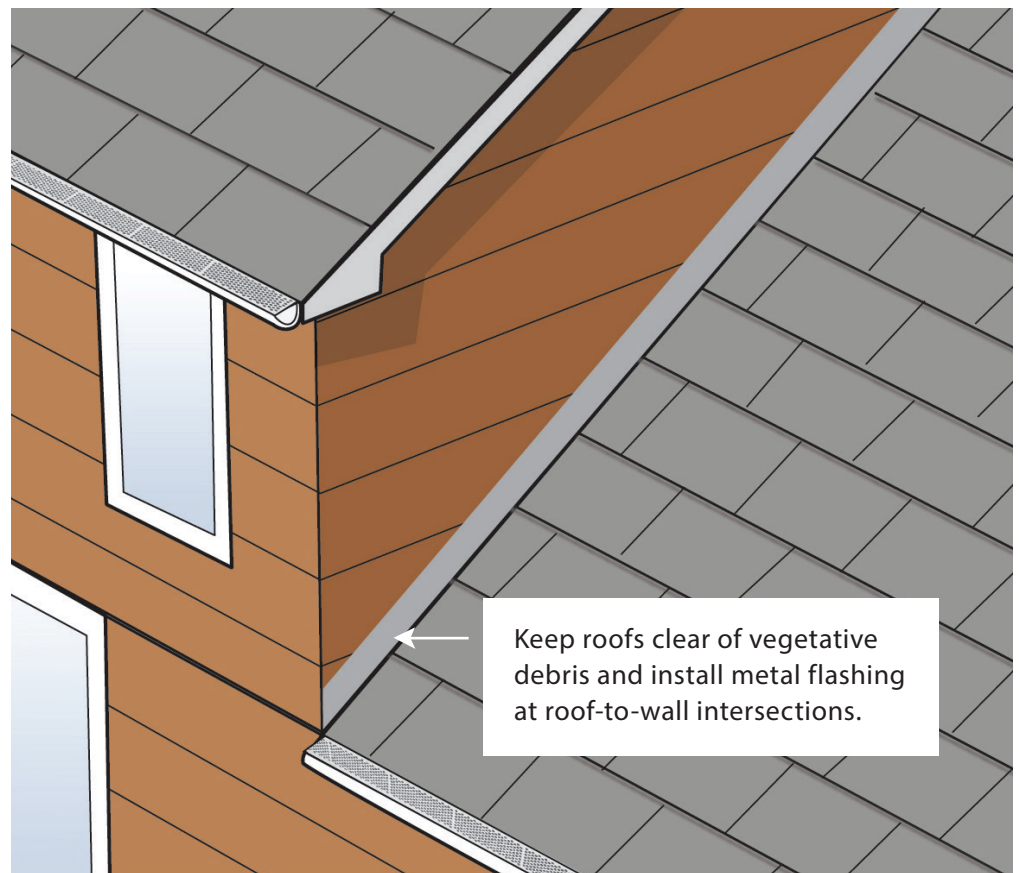


## Roof Edges

There can be several areas where the roof meets another material, such as at a roof-to-wall intersection in a split-level home or a dormer on a roof. These intersections are vulnerable areas because wind-blown embers will gather at the same locations where vegetative debris has accumulated, igniting the debris. Building materials usually change at edge-of-roof locations. The adjacent materials should provide comparable protection to the roofing material.

### HOW TO REDUCE THE VULNERABILITY OF ROOF EDGES

- ▶ Remove accumulated vegetative debris from roofs on a regular basis.
- ▶ Replace the combustible siding in roof-to-wall locations with a noncombustible option. Replacement of siding only in these locations will be less expensive than replacing all the home's siding. It may be possible to find a noncombustible siding pattern that is similar to the existing siding pattern.
- ▶ At a roof-to-siding location, use of metal flashing that extends up the siding at least 6-inches could also reduce the vulnerability of a combustible siding material. Install flashing so that water cannot get between flashing and siding.

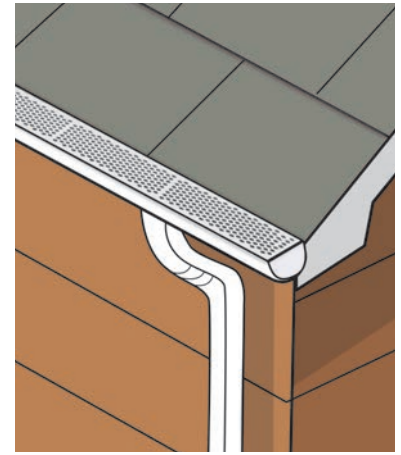


## Rain Gutters

Roofs can be vulnerable at the roof edge where a gutter is attached. Debris in the gutter can ignite from embers, and flames can ignite other components at the roof edge (e.g., wood-based sheathing and fascia board).

### HOW TO REDUCE THE VULNERABILITY OF RAIN GUTTERS

- ▶ Remove vegetative debris from gutters on a regular basis during fire season.
- ▶ Install a noncombustible and corrosion-resistant metal drip edge to provide protection for the combustible components (i.e., sheathing and fascia) at the edge of your roof.
- ▶ Use a noncombustible gutter cover to minimize accumulation of debris in the gutter. Some gutter covers result in accumulation of debris on the roof behind the gutter, so these will still require routine maintenance.

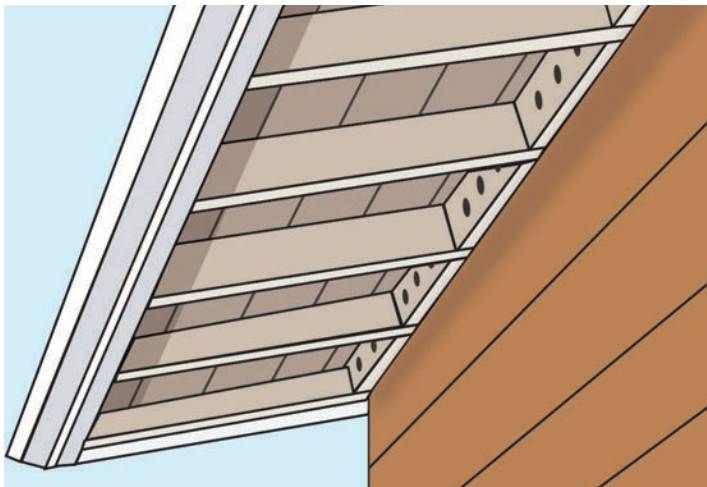


▲ *Install and maintain a noncombustible gutter cover (as pictured above) to help minimize debris accumulation in gutters.*

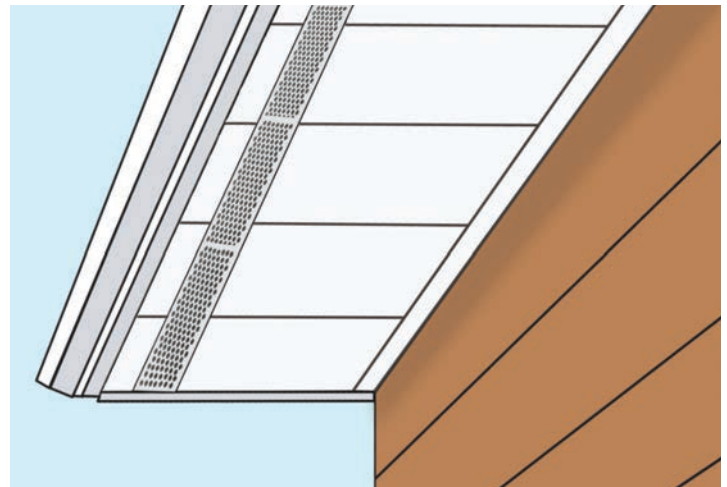
## Eaves

The under-eave area provides a point of entry for flames if nearby vegetation or other materials are burning. There are two basic designs for under-eave construction: open-eave and soffited-eave (i.e., one that is boxed in). Open-eave designs are more vulnerable to flames—heat can build up in an area between the roof rafters allowing for more rapid fire spread laterally, which increases the likelihood that fire will find a location to enter the attic. Vents that are in the blocking between rafters in open-eave construction are more vulnerable to the entry of embers than vents in a soffited-eave.

### OPEN EAVE



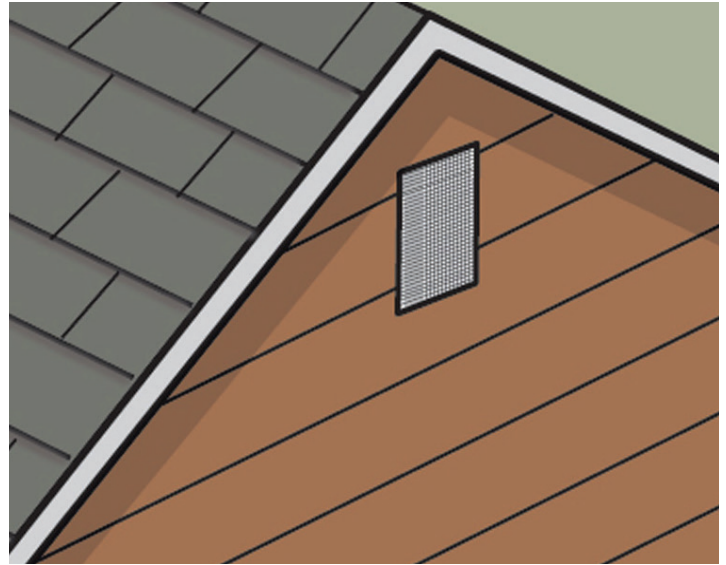
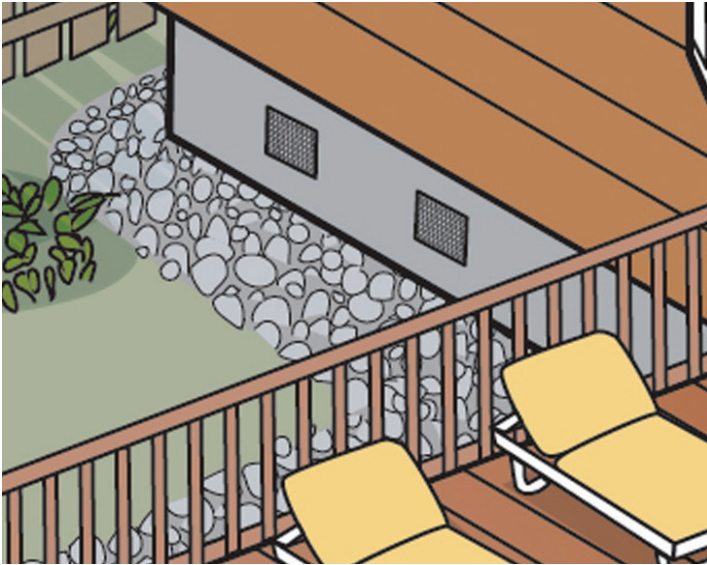
### SOFFITED EAVE



### HOW TO REDUCE THE VULNERABILITY OF EAVES

- ▶ Inspect open-eave areas for gaps where embers could lodge or pass through into the attic. All vents should be screened and all other gaps should be filled with durable caulk.
- ▶ Enclose under-eave area to create a soffited eave.

▲ *Enclose open eaves to protect attic spaces from ember intrusion.*



▲ *Cover all vents with 1/8-inch mesh screening.*

### WHAT IS THE DIFFERENCE BETWEEN VENT SCREEN SIZES?

**Small screens** (1/16-inch) can reduce both the size and number of embers that can pass through. Because the embers are smaller, they self-extinguish quickly after entering the attic and crawl space. While this screen size is ideal for resisting ember intrusion, it does require more maintenance because it gets easily clogged. Accumulated debris on vents can become a source of embers if not cleaned regularly. Air flow is also reduced with this size screen.

**Mid-size screens** (1/8-inch) allow more, larger embers to enter the attic and crawl space, but these are still better than 1/4-inch screens. This size screen is a common choice because the maintenance is lower while still being relatively effective.

**Large screens** (1/4-inch) allow many, larger embers to enter the attic and crawl space. It is recommended you replace or cover 1/4-inch screens with a smaller grain.

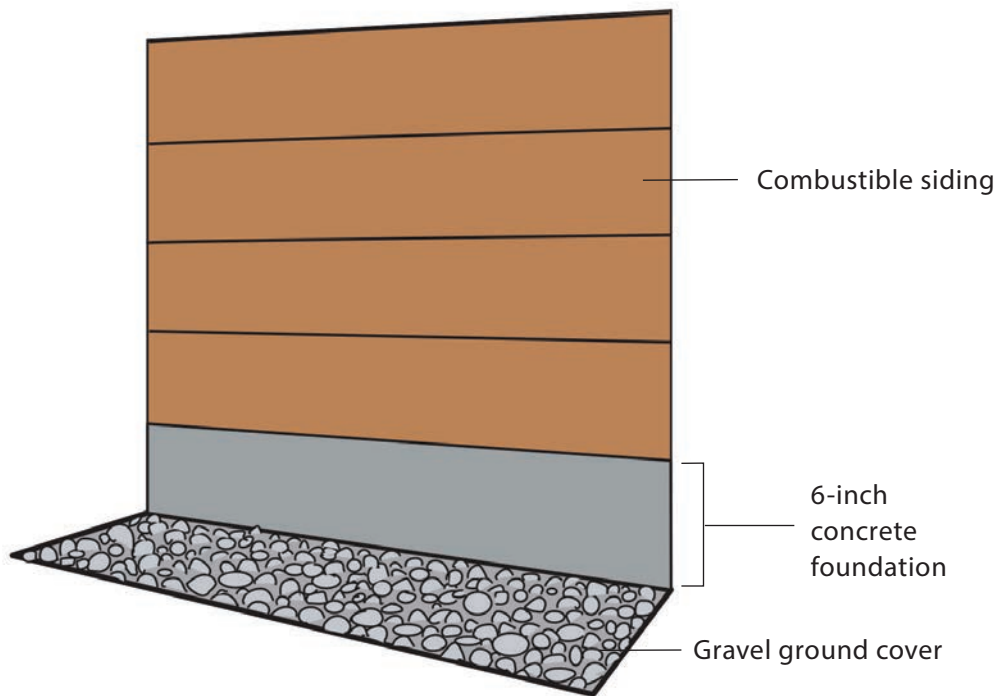
## Vents

Attic and crawl space vents provide an entry point for embers. Vents should be covered by, at a minimum, 1/8-inch noncombustible corrosion-resistant metal mesh screening. Screening will not prevent the intrusion of all embers but will minimize their size. Finer mesh screening (e.g., 1/16-inch mesh) is more effective at keeping embers out of the home but requires more maintenance because it can become clogged with debris. Vents that meet the flame- and ember-resistant standard are listed on the California Office of the State Fire Marshal Building Materials Listing Program website. These types of vents are appropriate in areas where maintaining defensible space is difficult, combustible materials are closer to the home, or combustible siding is used.

### HOW TO REDUCE THE VULNERABILITY OF ATTIC AND CRAWL SPACES

- ▶ Avoid storing combustible items (e.g., cardboard boxes, newspapers and magazines) near attic or crawl space vents.
- ▶ Inspect vents to make sure they are in good condition (i.e., screen is in good condition with no tears that would result in larger openings).
- ▶ If 1/4-inch mesh screening is present, replace or add, at a minimum, a 1/8-inch noncombustible corrosion resistant metal mesh screen.
- ▶ Consider replacing vents with a flame- and ember-resistant option.

Vent covers that are made ahead of time (i.e., before a wildfire is threatening) can be installed when wildfire is threatening the area. This strategy can be effective, but it does take time and should only be undertaken if ample time is given for evacuation. Preparation activities can be dangerous if evacuation is delayed.



## Siding

If the siding ignites, a fire can: **1)** penetrate through the stud cavity into the home, **2)** spread up the side of the home and enter windows or other openings such as dryer vents, and **3)** spread into the attic at a gable-end vent or an under-eave area. Combustible siding can be ignited from direct-flame contact or radiant heat exposure. Ignition of siding from embers can occur, especially if embers ignite combustible materials close to the home (e.g., bark mulch or wood pile), and if siding extends all the way to the ground.

Combustible siding products are widely used, including solid wood, wood composite materials and plastic/vinyl products. Vinyl siding can deform and slough off when exposed to flames or radiant heat. Once this happens, underlying material (e.g., sheathing) becomes important for protection. More complicated lap joints in wood-based siding patterns (e.g., shiplap and tongue-and-groove) are more resistant to fire penetration at the lap joint. Plain bevel joints in wood siding are vulnerable to fire penetration. While fiber cement siding often uses a plain bevel lap joint, it is less vulnerable to fire penetration.

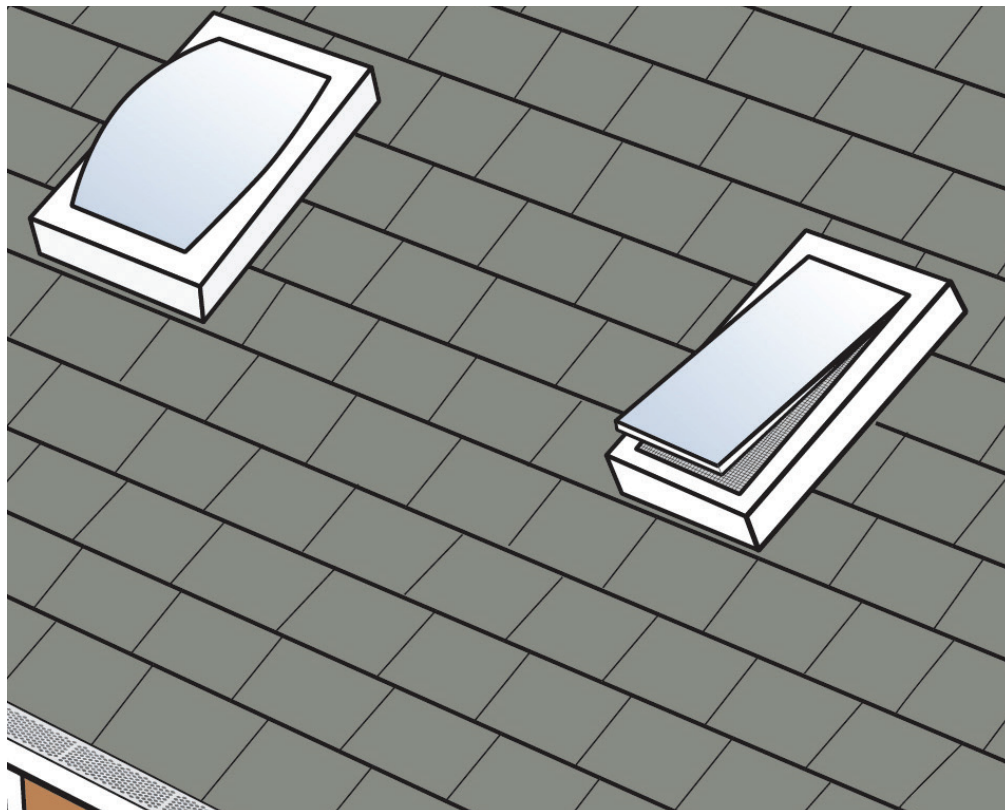
### HOW TO REDUCE THE VULNERABILITY OF SIDING

- ▶ Use noncombustible siding (e.g., stucco, steel and fiber cement), especially when neighboring homes are within 30-feet of the home.
- ▶ Make sure to develop and maintain adequate defensible space, particularly within the ember-resistant zone, to minimize the chance that siding will ignite from embers at the ground level or direct-flame contact from nearby combustible materials.
- ▶ In smaller areas that are vulnerable, such as at a roof-to-wall area, replace siding with a noncombustible product.
- ▶ For new construction, use of a one-hour wall design, where an additional fire resistant layer is used in the wall assembly, can provide additional protection when a more vulnerable siding material is used.

**It is not recommended** to use fire-retardant coatings, such as fire-retardant paint, to provide fire protection for combustible siding. Some state, county and local building codes do not allow these coatings. Recent research has demonstrated that their performance is degraded by exposure to the elements (e.g., snow, moisture, sun). Their effectiveness degrades more quickly than reported.



Clear debris around →  
skylights and make sure to  
close before evacuating.



## Skylights

Skylights can be a point for ember and flame entry if the cover fails, or if skylights are left open when a wildfire threatens. There are two basic kinds of skylights: domed-style made of plastic and flat-style made of glass. Flat-style, glass skylights have less risk than domed-style, plastic skylights that may melt and burn when exposed to heat from a wildfire. Typically, the glass in skylights consists of two layers, the outer being tempered glass and the inner being a safety glass, such as laminated glass.

Skylights on steeper sloped roofs can be vulnerable to radiant heat and flame contact exposures if nearby combustible materials ignite and burn. Skylights on low-slope (flatter) roofs are more prone to the accumulation of vegetative debris (especially flat-style skylights).

### HOW TO REDUCE THE VULNERABILITY OF SKYLIGHTS

- ▶ Remove vegetative debris from the roof, including on and adjacent to skylights, on a regular basis.
- ▶ On sloped roofs, glass skylights are the best choice because of increased likelihood of exposure to radiant heat.
- ▶ If the skylight can open, close it when wildfire is threatening to prevent embers from entering the home. Consider adding a 1/16-inch noncombustible corrosion resistant-metal mesh screening to reduce ember intrusion into the home in case the skylight cannot be closed before evacuation.

# Windows

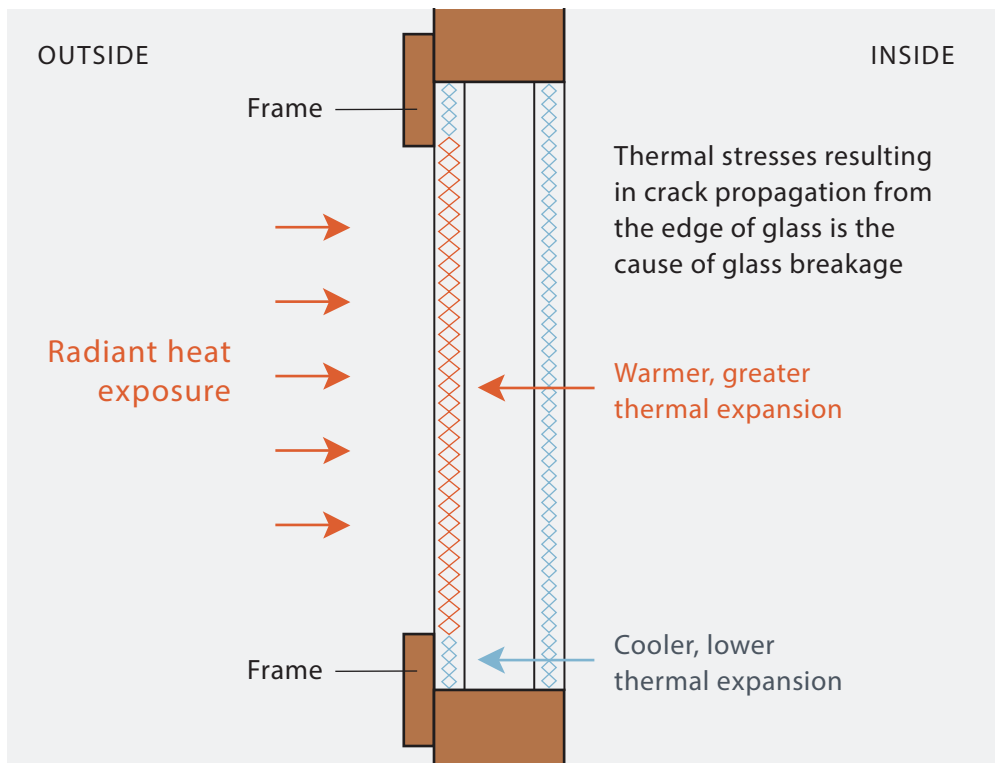
Windows can be a vulnerable component of a home if the framing material ignites or deforms, or if the glass breaks and falls out, both allowing embers or flames to enter the home. The most vulnerable part of a window is the glass. Glass breakage occurs when cracks, propagating from the outer edge inward, occur due to thermal stress that develops when a window is exposed to flames or radiant heat.

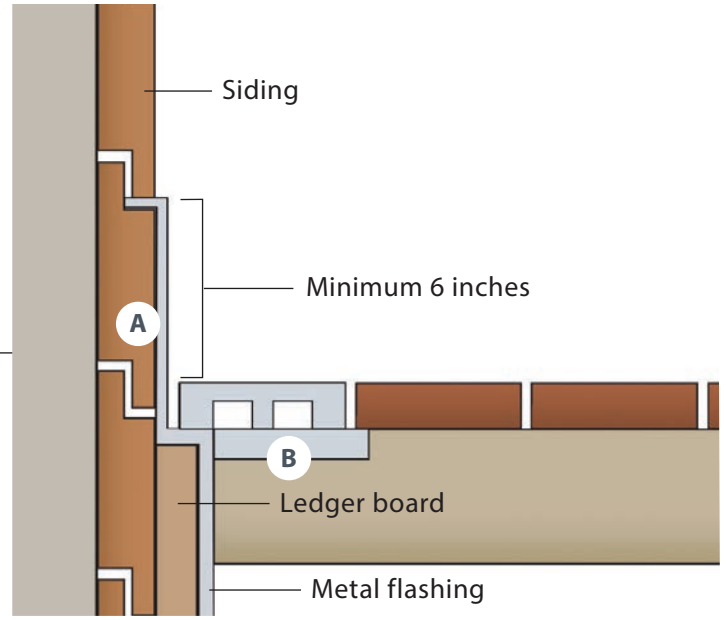
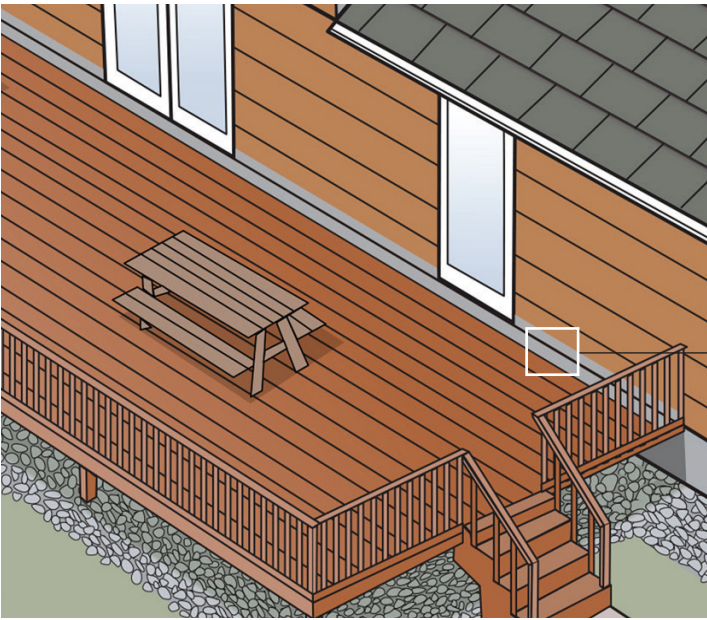
Tempered glass is three to four times more resistant to heat exposures than typical annealed glass and is therefore a better choice when selecting windows. Metal and plastic-clad fiberglass window screening will absorb radiant energy, providing additional protection against radiant heat exposure to the glass in your windows. Plastic-clad fiberglass screening will fail if flames contact it, reinforcing the need for an effective ember-resistant zone.

## HOW TO REDUCE THE VULNERABILITY OF WINDOWS

- ▶ When replacing windows, choose multi-pane options containing tempered glass.
- ▶ If neighbors or outbuildings are within 30-feet of the home, consider installing deployable noncombustible shutters to provide additional protection.
- ▶ Install screens in all operable windows. Screens increase ember resistance by keeping embers out of the home and also decrease radiant heat exposure.
- ▶ Close windows when wildfire is threatening.

## DUAL-PANE WINDOW





- A** *Install metal flashing between the ledger board and joists to protect the combustible siding material. The flashing should extend above and below the ledger board.*
- B** *Replace the deckboard next to the house with noncombustible material.*

## Decks

If a deck attached to a home ignites, the home can be exposed to flames and/or radiant heat. What is stored underneath and on top of decks can also be an ignition source. Depending on the decking material, embers can also directly ignite deck boards. Decks that overhang a slope can be exposed to flames if trees and other vegetation downslope of the deck ignite, resulting in flames contacting the bottom of the deck.

Most commercially available deck boards are combustible. These include redwood, cedar and tropical hardwoods, such as ipe, and all plastic composite lumber decking products. Pressure impregnated fire retardant treated (FRT) wood deck boards are less vulnerable to flames and embers. Higher density hardwood decking and plastic composite decking are less vulnerable to ignition by embers compared to softwood decking (i.e., redwood and cedar). Although some metal deck boards are now available, noncombustible options are typically referred to as solid surface decks because they consist of lightweight concrete, possibly with an additional noncombustible walking surface such as flagstone. Use of noncombustible (i.e., steel) joists in conjunction with combustible deck boards will reduce the overall vulnerability of the deck.

### HOW TO REDUCE THE VULNERABILITY OF DECKS

- ▶ Create an ember-resistant zone under the footprint of and around all decks. This action will reduce the likelihood of under-deck flame exposure.
- ▶ If a deck overhangs a slope, create and maintain an effective defensible space downslope of the deck to reduce the chance of flames reaching the underside of the deck.
- ▶ Apply metal flashing or foil-face bitumen tape on top of and a few inches down the side of the support joists. This is an effective strategy to minimize fire growth when a deck is ignited by embers, but would not help if the deck were ignited directly by flames under the deck. Using steel joists also reduces the vulnerability of the deck from both flames and embers.

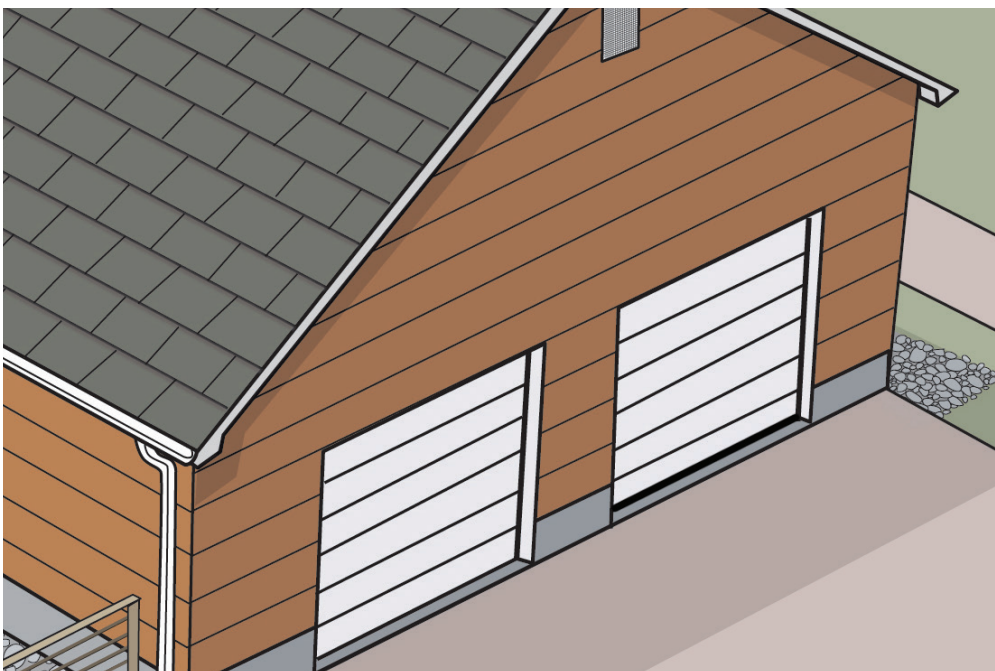
- ▶ For cedar and redwood decks, increase the size of the gap between deck boards to ¼ inch so that vegetative debris can fall through rather than accumulate on the deck. Be sure to routinely clear debris from under the deck.
- ▶ If a deck is made of combustible decking materials, replace the board closest to the home with a noncombustible material.
- ▶ In new deck construction, consider using noncombustible or higher density decking products.
- ▶ Move combustible cushions from deck furniture to inside and relocate combustible furniture (especially those with woven components that can trap embers) away from the house.

## Garages

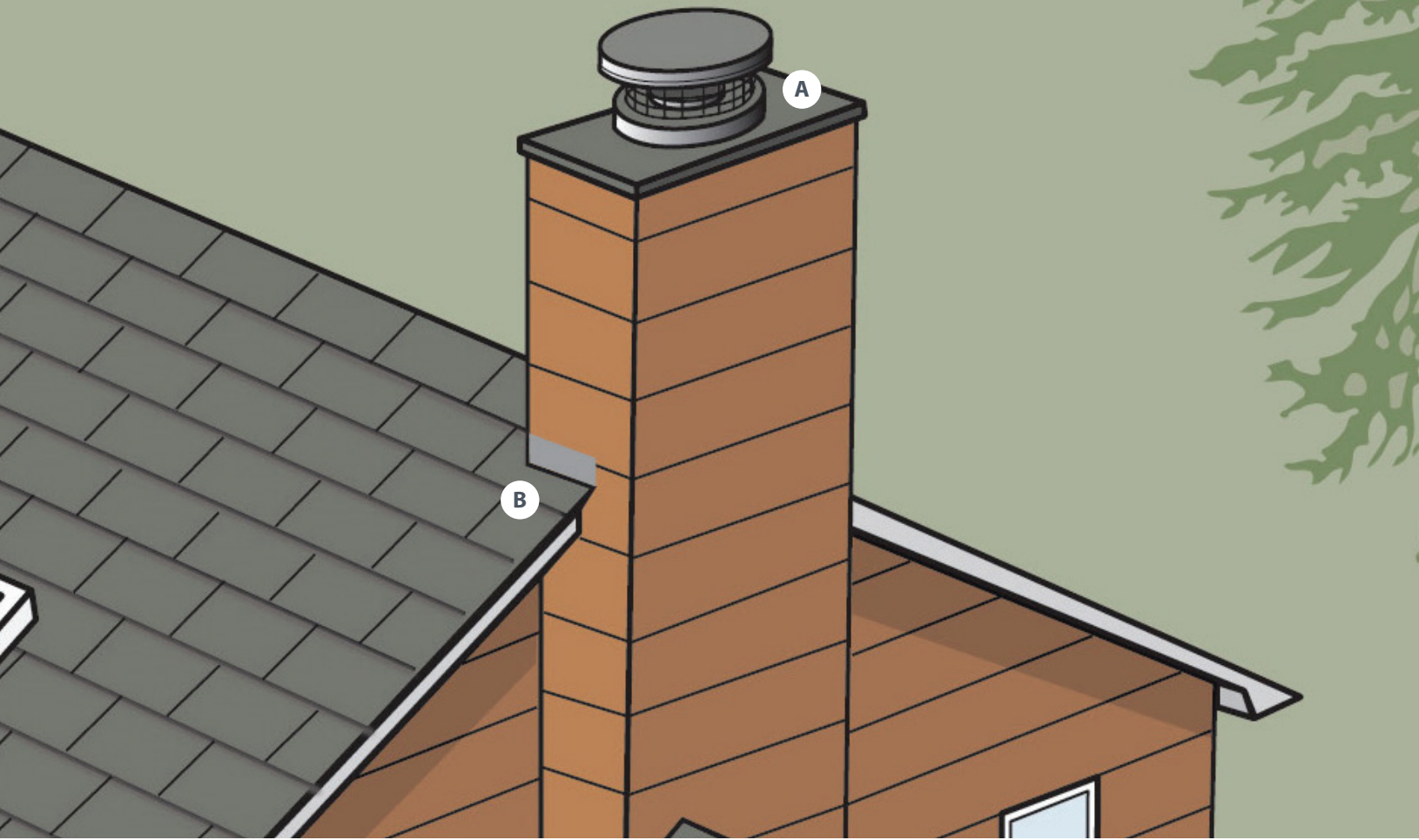
Garages, whether attached to the home or detached as a separate building, can threaten homes if the garage ignites. Since it is normal to store combustible materials in a garage, steps should be taken to reduce the ignitability of the garage because embers can easily enter under or around poorly sealed garage doors.

### HOW TO REDUCE THE VULNERABILITY OF GARAGES

- ▶ Whether a garage is detached or attached, include it in defensible space planning and maintenance, including the ember-resistant zone.
- ▶ Make sure the space between the garage door and framing is well sealed to minimize the entry of embers into the garage.
- ▶ Garage windows, vents and other construction components should be treated the same as they would be if part of the home.
- ▶ Add a battery back-up to the garage door motor so that the garage can easily be opened or closed if power is out.
- ▶ Close garage doors when wildfire is threatening.



← *Make sure garage doors are well sealed and closed before evacuating.*



- A** Cover the stovepipe/ chimney with a metal screen (no smaller than  $\frac{3}{8}$ -inch and no larger than  $\frac{1}{2}$ -inch).
- B** Install metal flashing at the chimney-roof intersection.

## Chimneys

Chimneys and stovepipes can be a vulnerable part of the home if not installed correctly and properly cleaned and maintained annually. Vegetative debris can accumulate on the roof adjacent to the chimney chase. This is another roof-to-wall connection that can be vulnerable to ignition by embers.

### HOW TO REDUCE THE VULNERABILITY OF CHIMNEYS

- ▶ Use of metal step flashing at roof-to-siding intersection (flashing extending up the wall) can reduce the vulnerability to embers.
- ▶ Cover chimney and stovepipe outlets with a noncombustible screen. Use metal screen material with openings no smaller than  $\frac{3}{8}$ -inch and no larger than  $\frac{1}{2}$ -inch to minimize embers leaving the chimney.
- ▶ Close the fireplace flue during fire season when the chimney is not in use.

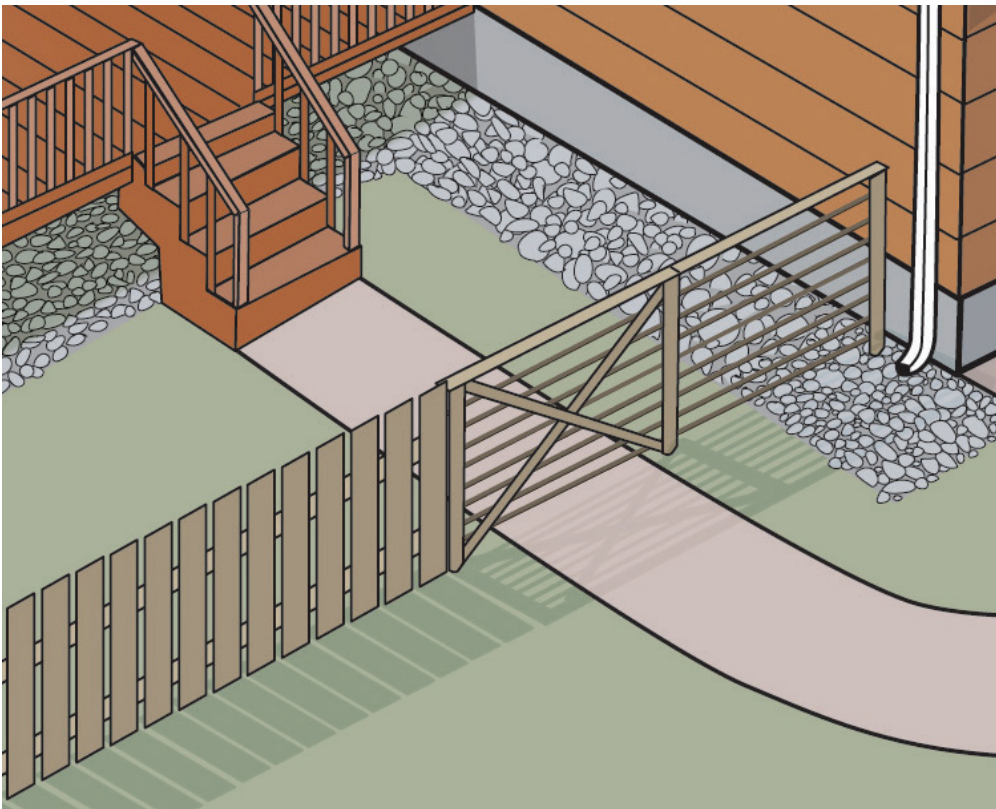
## Fences

Combustible fencing can provide a direct path to a home if surrounding vegetation or embers ignite it. Best practice is to separate the fence from the house or upgrade the last 5-feet of the fence to a noncombustible material to reduce the chance of the fence from bringing fire to the home.

Privacy fences (planks all on one side of horizontal supports) are the most vulnerable to ignition because the horizontal to vertical intersection provides a ledge and backstop where embers can accumulate and ignite the fence. Good neighbor (planks alternating) and lattice are more porous, and therefore more difficult to ignite via ember exposure. Vinyl fences are not as vulnerable to embers, but can ignite through direct flame exposure if vegetative debris has accumulated at its base. As is the case with vinyl siding, vinyl fencing will be vulnerable to deformation from radiant heat exposure. All fences are more vulnerable when vegetative debris has accumulated at their base.

### HOW TO REDUCE THE VULNERABILITY OF FENCES

- ▶ Replace the combustible portion of the fence near the home with a noncombustible section. The noncombustible section should be a minimum of 5-feet long.
- ▶ Remove vegetative debris that can accumulate at the base of the fence on a regular basis. Do not use fences as a trellis for plants because plants can create and trap ignitable vegetative debris.



← *Rather than replacing the entire fence, replace the 5-feet closest to the home with a noncombustible option.*

## Glossary

**BEVEL JOINT** A type of lap joint, typically seen in horizontally applied siding. This lap joint, when used with a combustible siding product, is the most vulnerable to fire penetration.

**CHIMNEY CHASE** The area or structure around metal flue pipes. The chase is usually built with wood, metal or brick.

**DORMER** A part of a building that extends beyond the vertical plane of the roof. This extension also has a roof covering and typically incorporates a window on the exterior wall.

**EMBER** Also called firebrand. Burning (or glowing) particles of vegetation from tree branches, parts of shrubs or chaparral, or other combustible materials (e.g., construction materials) that ignite and burn during a wildfire and are carried in wind currents to locations beyond the wildfire front.

**FIBER CEMENT** A generic term for a siding product that is made using cement, wood fiber and other additives.

**FINE-MESH SCREENING** In the context of this document, 1/8-inch or finer screening that is used to cover vent openings and operable windows.

**FOIL-FACE BITUMEN TAPE** A flashing material whereby an aluminum foil material is part of a bitumen tape system.

**GOOD-NEIGHBOR FENCE** In the context of this document, this type of fence is one where the vertical planks alternate between the sides of the horizontal support members. A “good-neighbor” fence is usually compared to a “privacy” fence, where the vertical planks are all on the same side of the horizontal supports.

**GYPSUM WALLBOARD** A panelized product made from calcium sulfate dihydrate. These panels are commonly used for paneling on the interior of homes and buildings. A special type of gypsum wallboard can be used as a fire-resistant component in a one-hour wall assembly.

**LADDER FUELS** Low-lying branches and vegetation that can help carry flames from the surface into the canopy of trees or shrubs.

**LAMINATED GLASS** A type of safety glass that consists of two (or more) layers of annealed glass that are connected with adhesive interlayers.

**LAP JOINT** The type of overlap connection between boards or panels on the siding of a building.

**METAL DRIP EDGE FLASHING** Also called angle flashing, this material is typically used to protect the edge of the roof where the roof covering meets the exterior (vertical) framing.

**MULTI-PANE WINDOW** A term used to indicate multiple glass panes in a window. One pane of glass would be indicated by “single-pane.”

**ONE-HOUR WALL CONSTRUCTION** An assembly that provides enhanced resistance to the penetration of fire.

**OPEN-EAVE** A type of construction whereby roof rafters are exposed in the area where they extend beyond the exterior walls of the building. In this type of construction, wood members, typical nominal 2-inch thick lumber, are used to fill the space between roof rafters.

**PLASTIC-CLAD FIBERGLASS SCREENING** Commonly used window screening material. Typical screen size is 1/16-inch mesh.

**PRESSURE-IMPREGNATED FIRE-RETARDANT TREATED** A process whereby a fire-retardant chemical is injected into the material (e.g., wood) under a pressurized process. This process results in a deeper penetration of the chemical into the wood.

**ROOF COVERING** The part of the roof assembly visible from outside the building. Common roof covering materials include asphalt composition shingles, tile and metal.

**SHEATHING** The first covering of boards or of waterproof material on the outside wall of the house.

**SHIPLAP** A type of lap joint used for horizontal and vertical siding. Along with tongue-and-groove pattern, this pattern is a better choice when considering improved resistance to fire penetration.

**SOFFITED-EAVE** A type of construction where the area of the roof rafters that extend beyond the exterior wall of a building are enclosed, typically by attaching a panelized product that connects the edge of the roof to the exterior wall.

**STUCCO** A siding material usually consisting of a mixture of sand, Portland cement, lime, water and other additives.

**TEMPERED GLASS** A heat-treated glass that enhances resistance to heat exposures three to four times over that of regular (annealed) glass.

**UNDERLAYMENT** A panel or sheet material in the roof assembly, underlying the roof covering, that improves the fire rating of the covering.

**VENT COVER** A solid material used to temporarily cover a vent opening to prevent the entry of embers.

## Online Resources

The following websites have resources and information on home-hardening, defensible space, and other tips to prepare for wildfire.

[Living With Fire Program - www.livingwithfire.com](http://www.livingwithfire.com)

[University of California Agriculture and Natural Resources - www.ucanr.edu/sites/fire](http://www.ucanr.edu/sites/fire)

[Insurance Institute for Home and Business Safety–Wildfire - www.ibhs.org](http://www.ibhs.org)

[CAL FIRE Ready for Wildfire - www.readyforwildfire.org](http://www.readyforwildfire.org)

[Sustainable Defensible Space - www.defensiblespace.org](http://www.defensiblespace.org)

## Acknowledgments

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## Partner Logos





SP-20-11

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Photo Courtesy of California Tahoe Conservancy / Nick Spannagel

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## **Individual Consideration Agenda**

### **Public Comment 1:**

**IWUIC: 504.5, 504.5.1 (New)**

**Proponents:** Milad Shabaniyan, representing Insurance Institute for Business and Home Safety (mshabaniyan@ibhs.org); T. Eric Stafford, representing Insurance Institute for Business and Home Safety (testafford@charter.net) requests As Modified by Public Comment

**Modify as follows:**

### **2021 International Wildland-Urban Interface Code**

**504.5 Exterior walls .** ~~Exterior surfaces of exterior walls shall be noncombustible for a minimum of 6 inches vertically from horizontal surfaces such as ground or attached decking.~~ Exterior walls of buildings or structures shall be constructed with one of the following methods:

1. Materials *approved* for not less than 1-hour *fire-resistance-rated construction* on the exterior side.
2. *Approved noncombustible materials.*
3. Heavy timber or *log wall construction.*
4. Fire-retardant-treated wood on the exterior side. The fire-retardant-treated wood shall be labeled for exterior use and meet the requirements of Section 2303.2 of the International Building Code.
5. Ignition-resistant materials complying with Section 503.2 on the exterior side.

Such material shall extend from the top of the foundation to the underside of the roof sheathing.

#### **504.5.1 Flashing.**

A minimum of 6 inches of metal flashing or noncombustible material applied vertically on the exterior of the wall shall be installed at the ground, decking, and roof intersections.

**Commenter's Reason:** This public comment addresses some of the comments provided by the committee on the original proposal and improves upon the language for clarity. Some on the committee indicated the language was confusing and didn't clearly specify the required location of noncombustible siding. Additionally, there was also some confusion regarding the location of the noncombustible siding at deck-to-wall intersections. The new language proposed in this public comment clearly specifies where the noncombustible material is required to be installed and is worded similarly to a comparable section in Chapter 7A of the California Building Code.

Tests performed at the IBHS Research Center show the importance of preventing ignition of the siding due to wind-blown embers. Figures 1 and 2 depict a full-scale experiment on exterior walls and an attached deck assembly exposed to wind-blown embers. According to these studies, wind-flow will trap the embers and combustible debris at the base of the exterior walls and at the base of other horizontal surfaces such as attached decks [1,2]. The figures clearly show the ember accumulation at these locations. Protecting the exterior walls at these locations with noncombustible materials will improve the fire-performance of these walls and break the fuel load path toward the main structural elements.



Figure 1. Ember accumulation at the intersection of exterior walls and ground [2].

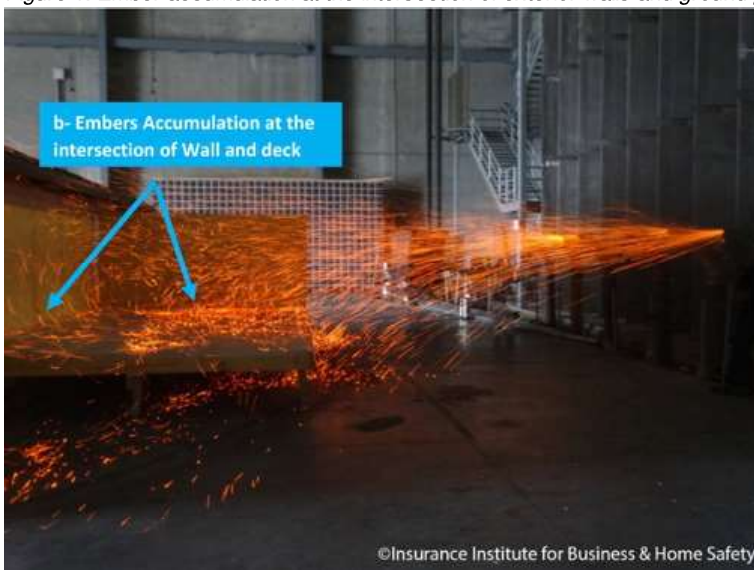


Figure 2. Ember accumulation at the intersection of exterior walls and a deck assembly [2].

To determine the necessary noncombustible vertical clearance to protect these walls from igniting, IBHS conducted two additional experiments on exposed exterior walls. In the first experiment, three different wall configurations were exposed to wind-blown embers without combustible debris located at the base of the wall. These assemblies included the following:

- No separation between the base and combustible siding,
- 2 inches of noncombustible material between the base and combustible siding, and
- 6 inches of noncombustible material between the base and combustible siding.

As shown in Figure 3, the wall assembly with no separation was ignited by embers even in the absence of combustible debris at the base of the wall. The assemblies with 2 and 6 inches of noncombustible material between the base of the wall and combustible siding did not ignite by the embers.



Figure 3. Accumulation of embers at the base of the exterior walls.

In the second experiment, an exterior wall assembly with combustible debris approximately 1 inch in thickness at the base was exposed to a small fire. During this test, the heat distribution along the walls was recorded by 18 thermocouples and an infrared camera. Thermocouples were placed at 2, 4, and 6 inches vertically from the ground level to record the heat distribution along the wall. Figures 4 and 5 depict the exterior wall assembly during the fire test and identifies the thermocouple arrangement.



Figure 4. Exterior wall exposed to a small fire with 6-in noncombustible vertical clearance.

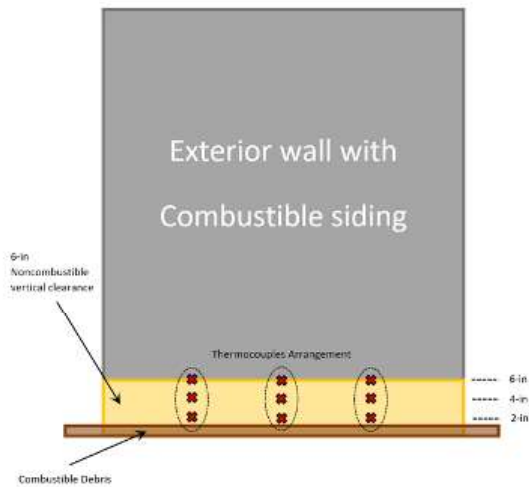


Figure 5. Exterior wall and thermocouples arrangement.

The heat distribution recorded along the wall confirms that even small fires can easily ignite combustible siding at 2 and 4 inches from the ground level. The photograph in Figure 6 was taken with an infrared camera and shows heat distribution at the base of the wall at 2 inches from the ground level. The measured temperature at this level was 276 °C which is high enough to ignite the plywood siding panel.

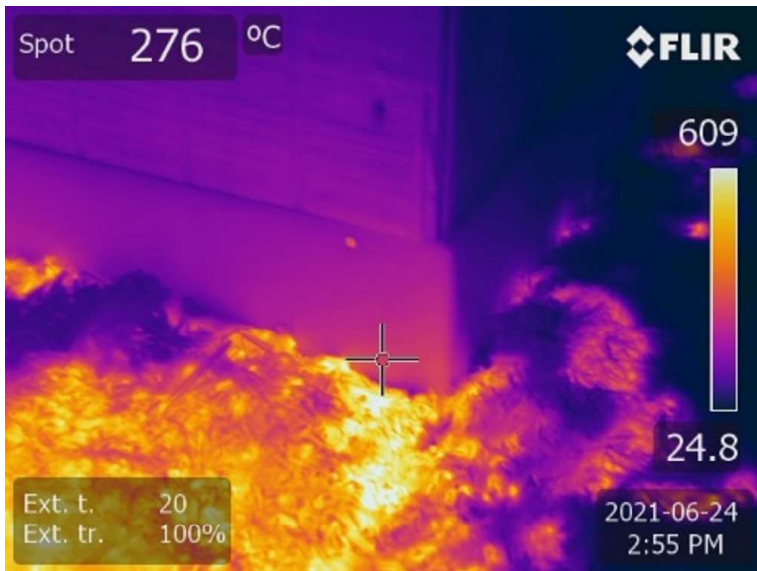


Figure 6. Heat distribution at 2 inches above ground level with the base of the exterior wall exposed to the small fire.

The photograph in Figure 7 shows heat distribution at the base of the wall at 6 inches from the ground level. The measured temperature at 6 inches from the ground level was significantly lower than 2- and 4-inch heights. It's important to note that the combustible siding, which was separated from the ground by 6 inches of noncombustible material, did not ignite during the test.

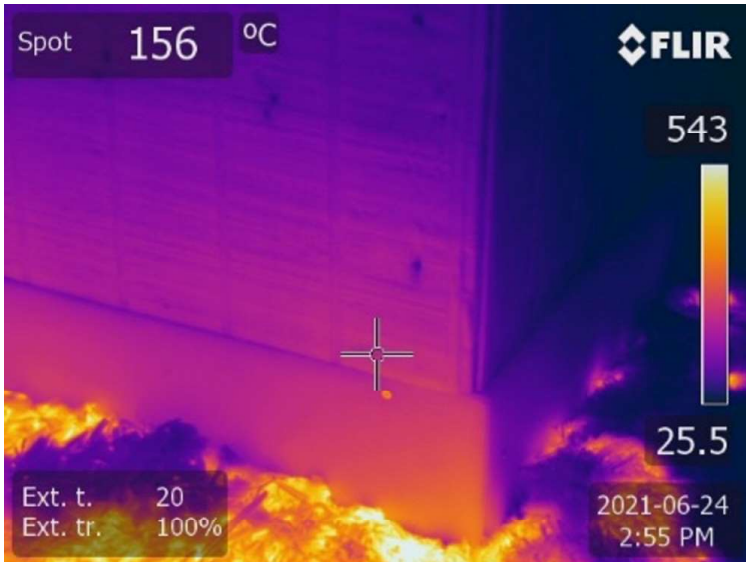


Figure 7. Heat distribution at 6 inches above ground level with the base of the exterior wall exposed to the small fire.

Figure 8 reveals the average heat distribution at the base and in different heights of 2-, 4-, and 6-in. Based on the recorded heat distribution along the wall and the likelihood of having trapped combustible debris at these locations, the tests clearly demonstrate that having a minimum of 6 inches of noncombustible material between horizontal surfaces and exterior combustible siding will significantly reduce the potential for ignition of combustible siding. This code change would make the IWUIC consistent with NFPA 1144 which also requires a minimum of 6 inches of noncombustible material between base of horizontal surfaces and combustible siding.

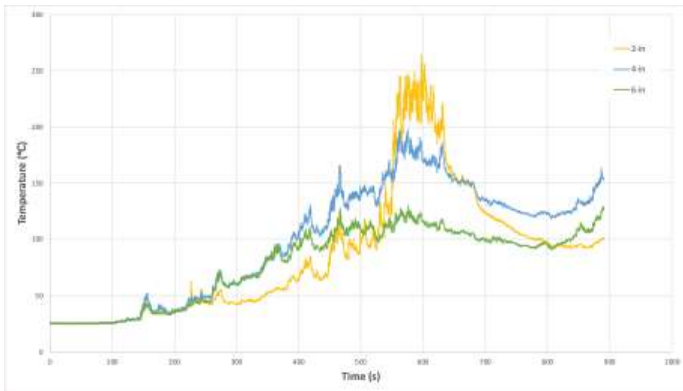


Figure 8. Average heat distribution at the base of the exterior wall.

**Bibliography:** [1] Quarles S (2017) Vulnerability of Vents to Wind-Blown Embers. Insurance Institute of Business & Home Safety, Richburg

**Cost Impact:** The net effect of the public comment and code change proposal will increase the cost of construction

This code change proposal may increase the cost of construction slightly as it will likely increase the cost of construction with some additional flashing necessary to comply with this section.




Item 10 Height of Wall Assembly – Hardening exterior walls and deck supports 2 ft above ground will prevent windblown debris and embers from igniting the wall.

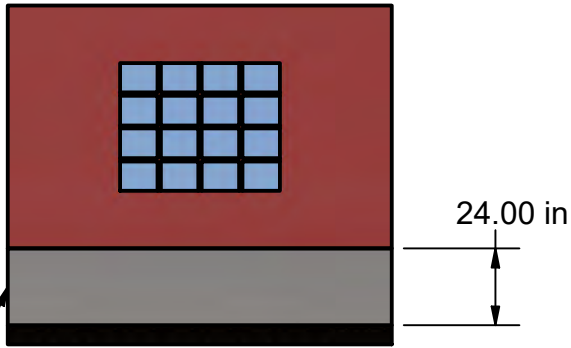
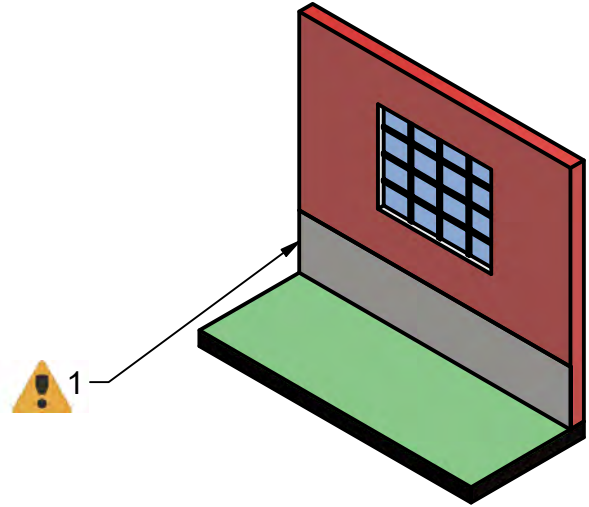
Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

HMM Reference	
NIST Technical Note 2205, Height of Wall Assembly, Table A, Item 10 (Page 58)	
Project: HMM House	Size: A
Scale: 1:60	Sheet: 1/1

- **Hardening Action:** Replace exterior wall covering with noncombustible material for first two ft (from ground) and add metal flashing to protect bottom edge sheathing
- **Applicable Conditions:** All sheathing within two feet of the ground
- **Performance Goals:** Prevent windblown debris and embers from igniting the wall

Installation Cautions 

1. Seal noncombustible wall covering to house exterior.



Notes

- Metal flashing is required for all claddings, including ignition resistant materials

Fire Hazards 

1. If superheated by close proximity to flame, metal flashing risks igniting siding



# Prepare and Protect Your Home from Wildfire

**BE WILDFIRE  
READY**

A guide to help you protect your property from wildfire.

In a wildfire disaster, homes are ignited by embers, flames and/or radiant heat. Embers pose the greatest threat as wind can carry them ahead of a fire front, igniting spot fires in and around residential areas. In neighborhoods where hundreds of homes are lost, IBHS has documented and tested vulnerable factors in and around homes. We can't stop the wildfire, but IBHS has the science to provide measures to reduce property losses and prevent avoidable suffering. These are the specific actions homeowners can take.

## Start with Critical Prep!

Protecting your home from wildfire requires a system of proactive measures. No one thing reduces risk completely. By combining the following critical actions, preparing your home and creating defensible space, you significantly improve the likelihood of your home's survival.

### 1. Create a wildfire plan for your family and home

- **A wildfire plan should include the following:**
  - Compile a list of emergency contacts including fire, police, family, neighbors, friends, and your insurance agent.
  - Identify and map out an evacuation plan for your family, including a designated meeting place and multiple evacuation routes. Know where your evacuation centers and shelters are located.
  - Create a communications plan for how you will communicate with family during a wildfire event.
  - Prepare an emergency supply kit that includes important documents.
  - Identify who will complete last-minute home prep to remove combustible items and debris around your home.
  - Purchase fire safety equipment such as fire extinguishers and hoses.
  - Create an evacuation plan for pets.
- **Know how to open your garage door when the power is out.**
- **Stay informed:**
  - Download the FEMA App to receive alerts from the National Weather Service.
  - Sign up for community alerts in your area.
  - Enable Wireless Emergency Alerts (WEAs) on your cell phone.



#### Why?

Having a wildfire plan in place ensures the safety of you and your family. In the event of an evacuation, a plan enables you to make time-sensitive decisions, communicate clearly, safeguard important documents and proactively implement measures to prevent damage to your home.

- **Know what your insurance covers and what it doesn't and be sure to document your belongings.**
- **Begin proactive critical prep to protect your home before an impending wildfire.**

# PREPARE YOUR HOME

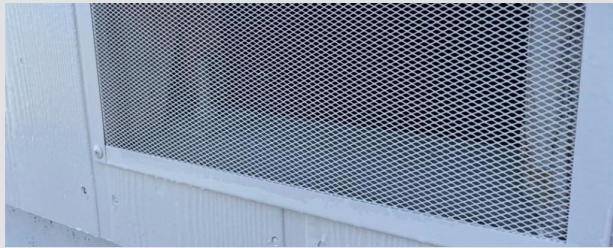
## 2. Check and maintain your roof and gutters

- Maintain your roof and gutters by regularly removing all debris, including leaves and pine needles.
- Replace a wood shake or wood shingle roof with a Class A fire-resistant-rated roof cover. Class A-rated roof covers include most asphalt shingles, tile, slate, and metal roofs.
- Replace domed, plastic skylights with flat, multipaned, tempered glass skylights.
- Replace plastic gutters with metal gutters such as aluminum.



### Why?

The roof is the most vulnerable part of your home. Embers can travel miles ahead of a fire front and land on your roof and in open gutters. These embers can ignite anything combustible like plastic skylights, wood shake shingles and built-up tree debris.



### Why?

Wind-blown embers can enter your home through vents in your attic, roof, gables, and crawlspace and ignite materials inside.

## 3. Install ember-resistant vents

- Install ember-resistant vents or cover existing vents with 1/8-inch metal wire mesh.
- Ensure your metal dryer vent has a louver or flap to reduce ember entry. Due to its design and function, wire mesh should not be used on dryer vents.
- Clean vent screens periodically by removing accumulated debris.
- Install spark arrestors with 1/2-inch mesh screening at the outlet of all chimneys.

## 4. Ensure a 6-inch vertical clearance on exterior walls

- Ensure there is a minimum of 6 vertical inches (measured from the ground up and from any attached horizontal surface like a deck) of noncombustible siding material, such as fiber-cement, brick, stone, stucco, or exposed concrete foundation.

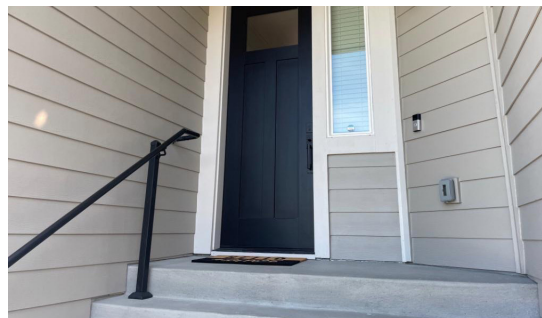


### Why?

Embers accumulate against homes at the base of exterior walls and on other horizontal surfaces like decks that can ignite the home.

## 5. Clear and maintain decks and covered porches

- On top of the deck or on the porch:
  - Maintain your deck by regularly clearing vegetative debris.
  - Remove combustible furniture, including wood or plastic furniture.
  - Remove large combustible rugs and planters.
  - Choose noncombustible furniture such as cast aluminum or metal furniture.
  - Ensure any items like cushions or door mats are small enough to easily be moved inside on Red Flag days.
- Underneath the deck:
  - Remove anything stored under the deck or stairs.
  - Remove all vegetation—including grass or weeds—from under the deck and stairs.
- For decks 4 feet or less (measured from the ground to the walking surface)
  - Enclose the area underneath to keep debris and embers out by:
    - Installing 1/8-inch or finer metal wire mesh around the outer edge of the walking surface extending to the ground, or
    - Installing a noncombustible wall covering.



### Why?

Decks and porches attached to or built near your home provide a path for fire to reach your home. Reducing or eliminating the vulnerabilities of a deck or porch—including items on top of or underneath—reduces the chance your home ignites.

# CREATE DEFENSIBLE SPACE

## 6. Create a 5-foot noncombustible buffer

- **Remove all vegetation and groundcover in the first 5 feet**
  - Remove all vegetation, grass, weeds, shrubs, plants, trees, etc.
  - Remove wood mulch, pine straw, rubber mulch, or other combustible ground covers.
  - Trim back branches that overhang the 5-foot area.
  - Do not allow vines to grow on buildings, fences, or other structures within 5 feet of the building.
- **Install 5-feet of hardscape around your home**
  - Install hard groundcover material such as gravel, pavers, river rocks, steppingstones, or concrete.
  - Install 5 feet of hard groundcover surrounding any decks or covered porches, including under the stairs.
- **Replace combustible fencing within 5 feet**
  - Replace any wood or plastic fencing and gates located within 5 feet of the home with a noncombustible fence, such as metal (aluminum or chain link).
- **Maintain the 5-foot Home Ignition Zone**
  - Routinely clear tree debris, weeds, grass, and dead plant material.
  - Do not park or store any vehicles, boats, RVs, or ATVs within 5 feet of the home. Ideally, store these items in a closed garage or park them at least 30 feet away from the home.



### Why?

During a wildfire, embers can travel miles ahead of a fire front and accumulate at the base of your home's exterior walls and within the first 5 feet.

Anything combustible in this critical zone acts as a fuel source for ignition, increasing the risk of flames spreading to your home.

It is crucial to establish a clear, noncombustible zone that extends 5 feet out from the exterior walls of your home or any nearby structures. This noncombustible area should also be created around attached decks, patios, covered porches and stairs. By implementing this zone, you can significantly reduce potential for ignition.

- Do not store anything combustible such as firewood, potted plants, outdoor furniture, trash cans, pet houses, lawn tools, children's playsets, etc., in this zone.

## 7. Extend your Defensible Space (5-30 feet)

- **Maintain the yard**
  - Cut grass to at most 4 inches and keep watered.
  - Routinely clear tree debris such as leaves and pine needles. Make sure areas around fences and underneath gates are clear of debris, as this is another area where embers can collect.
  - Remove dead vegetation, including piles from pruning and firewood.
  - Firewood and large propane tanks should be located at least 30 feet from any structures.
- **Trim trees**
  - Remove tree branches less than 6 feet above the ground.
  - Trim upper branches of trees to ensure at least 10 feet of space between the canopies of neighboring trees.
  - Work with your neighbors to address trees near the property line that affect both properties.
  - Ask your power company to remove branches that are near power lines. Never attempt to do this job yourself.
- **Shrubs**
  - Choose low growing, fire-resistant plants.
  - Relocate any shrubs located under or near trees.
  - Keep low-growing bushes and shrubs spaced out or in small groupings (no more than 3 shrubs) that will result in a discontinuous path of vegetation.
  - Remove any hedges or rows of bushes that will create more fuel and a pathway for fire to reach your home.
- **Maintain small structures near your home**
  - Place structures (i.e., sheds, pergolas, and playsets) at least 10 feet away from the home or any attached decks.
  - Create a 0-5-foot noncombustible zone around each structure.
  - Ensure there is a minimum of 6 vertical inches (measured from the ground up) of noncombustible siding material at the base of each structure or any horizontal surfaces such as a wooden playset, just as you would for your home. For an elevated structure like a shed, enclose the base with no larger than 1/8-inch or finer metal wire mesh.
  - If you have multiple structures, such as a shed and playset, ensure these structures are spaced at least 10 feet apart. Have at most 3 of these structures within 30 feet.

### Why?

Embers blown from miles away can easily start spot fires around your home.

Creating and maintaining defensible space on your property will slow the spread of fire and reduce flame intensity near your home.

By spacing out bushes and trees, you are removing ladder fuels that allow fire to spread and reducing the intensity of a fire near your home.



These fundamental, critical steps serve as a starting point before progressing to the next set of actions. If you're ready for additional layers of wildfire protection, consider leveling up with **Home Upgrades**.

# Home Upgrades to Further Protect Against Wildfire

**BE WILDFIRE  
READY**

A guide to help you protect  
your property from wildfire.

## Level Up!

After addressing the critical mitigation prep, this group of larger home improvements will give your home an additional level of protection against flame exposure during a wildfire.

### 1. Enclose underside of eaves

- Enclose eaves on the underside by installing noncombustible or ignition-resistant soffits (e.g., a noncombustible siding material) or 2-inch or thicker lumber.
  - Remember, eave vents should be ember resistant or include no larger than 1/8-inch or finer metal wire mesh.



#### Why?

Because of their geometry, radiant heat can build up in an open eave and ignite exposed materials. Flames from nearby fuels such as a shed or vegetation can also ignite eaves.

### 2. Cover gutters

- Install noncombustible gutter guards.
- Ensure gutter guards are clear of tree debris. Depending on the type of cover that was installed, some require little to no maintenance.



#### Why?

Tree debris can collect in gutters providing fuel for embers to land on and ignite. When ignited, this debris could expose the fascia, roof, and attic to flames. While regularly cleaning gutters can also address this vulnerability, adding gutter covers reduces maintenance.

### 3. Move structures farther away from your home

- Move structures like sheds, pergolas, playsets, and other outbuildings at least 30 feet away from your home.



#### Why?

Burning sheds, pergolas, playsets, and other structures increase the risk to a home because of the additional radiant heat, flames, and embers produced. Moving these accessory structures farther away better protects the home.

## 4. Upgrade windows and doors

### Windows

- Replace all exterior windows with tempered, multipaned glass or fire-resistant glass blocks.

### Doors

- Upgrade to solid exterior doors that have a metal threshold and are constructed with a noncombustible or ignition-resistant material such as metal, fiberglass or solid hardwood.
- If you choose a door that includes glass, make sure it is made with tempered, multipaned glass.
- Alternatively, install a noncombustible storm door as the outermost door.



### Why?

During a wildfire, windows and doors are susceptible to flames. Upgrading windows and doors can help keep flames from entering and igniting materials inside the home.

## 5. Install noncombustible siding

- Replace combustible siding including wood, wood-fiber, or vinyl siding with a noncombustible material like concrete-fiber board, stucco, brick, or stone veneer.



### Why?

Radiant heat, embers, and flames can ignite combustible siding.

While the 6-inch vertical noncombustible zone protects against embers, replacing all combustible siding provides greater protection against flames and radiant heat. Flames can spread across combustible siding to reach other vulnerable areas—like windows and eaves—and can begin a cascade of damage.

## 6. Enclose under bay windows

- Enclose the area underneath a ground floor bay window with an exterior wall and noncombustible siding.



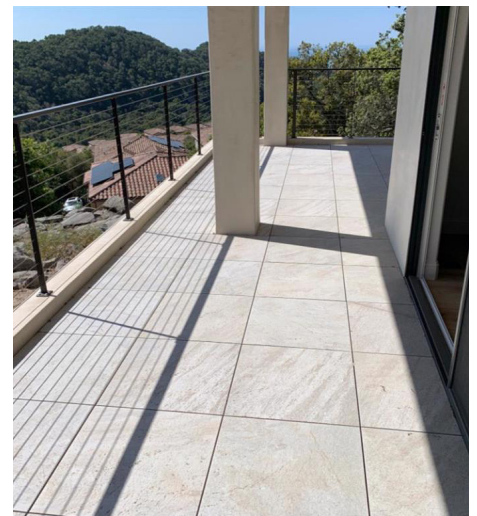
### Why?

The geometry of ground-level bay windows traps heat which can ignite the home.

Embers can also collect under ground-level bay windows and ignite tree debris.

## 7. Build a fire-resistant deck

- When building a new deck, use metal joists and a fire-resistant walking surface like a lightweight concrete, aluminum, or fire-rated composite deck material.
- When retrofitting an existing deck, use noncombustible materials like metal (aluminum or steel), stone veneer, or a lightweight concrete to:
  - Ensure the bottom 6 inches of posts are noncombustible.
  - Select noncombustible hand railings especially in the first 5 feet attached to the home.
  - Choose a solid (no gap), noncombustible walking surface, including the stairs.



### Why?

Attached decks made from combustible material are vulnerable to ignition and can be a pathway to carry fire to your home. Eliminating the combustible material reduces this risk.

## 8. Remove back-to-back fencing

- If you and your neighbor(s) have separate, parallel fences that are less than 5 feet apart, work with your neighbor to remove any sections of back-to-back fencing.



### Why?

Back-to-back fences can trap debris between them, creating a susceptible fuel bed for embers to ignite both fences. The two fences together provide greater fuel for a more intense fire.

## 9. Improve fire-fighting capabilities

### Provide proper address identification

- Choose numbers that are 4 inches on a contrasting background and/or reflective or illuminated.
- Place address numbers so that they are visible from the street and from both directions of travel.

### Improve access

- Create a driveway clearance of at least 12 feet wide and 13.5 feet tall.
- If the property is gated, gates should open inward and be placed at least 30 feet from the roadway.



### Why?

When there is an emergency you will want to make sure emergency services personnel can quickly locate your home to render services.

## 10. Work with your neighbors and community

- Talk to your neighbors about wildfire, what you've proactively done and how they can make improvements.
- Work with community-organized fire safe councils to help spread the message and prepare for wildfire at scale.



### Why?

Communities are growing and homes in suburban neighborhoods are built in close proximity. This makes working with neighbors vital. No matter how well-prepared your home may be, it is not immune to fire if your neighbor's house catches fire. What your neighbor has on their property will likely affect what will happen to yours.

## 2024 National Green Building Standard Update

Public Comment Submission Form



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**Public Comments on the 2024 National Green Building Standard (NGBS) Draft 2 will be accepted April 12, 2024 through May 27, 2024.**

*Thank you for your Proposed Changes / Public Comment to the National Green Building Standard™.*

Below is a summary of the Public Comment(s) that you have submitted on the 2024 National Green Building Standard Draft 2.

ID	Section	Section #	Proposed Change	Reason
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8501	CHAPTER 5: LOT DESIGN, PREPARATION, AND DEVELOPMENT	505.12 Wildfire resilience	<p><b>505.12 Wildfire resilience</b></p> <p>(1) Defensible space is part of the construction site plan.</p> <p>a) Within 0- 5 feet of the building only <del>hardscapes and succulents</del> are <u>noncombustible ground cover such as gravel, pavers, or bare soil may be used for landscaping</u> (1 point)</p> <p>b) Within 5- 30 feet of the building <u>Fire Smart vegetation such as certain</u> thin trees and shrubbery, and no undergrowth for vegetation and no accessory buildings are present (1 point for projects in WUI area)</p> <p>c) <u>Non-combustible fencing is used</u> (1 point)</p> <p>(2) <u>Home hardening is part of the construction development plan.</u></p> <p>(a) <u>Roof and Wall Assemblies are designed to resist the impingement of flame via approved rated assemblies</u> (1 point each)</p> <p>(i) <u>Roof assemblies are Class A Rated per ASTM E108 or UL 790</u></p> <p>(ii) <u>Wall assemblies are 1-hour fire-resistance rated per ASTM E119 or UL 263 from the exterior side</u></p> <p>(b) <u>Materials used are designed to resist ignition caused by embers, ember accumulation, radiant heat, or direct flame.</u> (1 point each)</p> <p>(i) <u>Noncombustible fencing</u></p> <p>(ii) <u>Ember resistant vents such as vents covered with a maximum 1/8" noncombustible mesh or vents tested to ASTM E2886</u></p> <p>(iii) <u>Noncombustible materials or metal flashing are used for minimum 6 inches at base of walls and decks</u></p> <p>(iv) <u>Noncombustible, fire-retardant treated wood or ignition resistant siding is used</u></p> <p>(v) <u>Gutters made of noncombustible materials, and covered to prevent accumulation of leaves and other debris</u></p> <p>(vi) <u>Eaves and Soffits are enclosed with noncombustible or ignition resistant materials</u></p> <p>(vii) <u>Noncombustible deck surface</u></p> <p>23) <u>Response Planning</u></p> <p>(a) <u>Water sources (ponds, swimming pools, wells etc.) are available, readily accessible, and equipped for fire-fighting use.</u> (1 point for projects in the WUI area)</p> <p>-----</p> <p>Please add the following to reference section 14:</p> <table border="1" data-bbox="630 1470 1458 1953"> <thead> <tr> <th>Document</th> <th>Date</th> <th>Title</th> <th>Section</th> </tr> </thead> <tbody> <tr> <td>ASTM E108</td> <td>2020</td> <td>Standard Test Methods for Fire Tests of Roof Coverings</td> <td></td> </tr> <tr> <td>ASTM E119</td> <td>2020</td> <td>Standard Test Methods for Fire Tests of Building Construction and Materials</td> <td></td> </tr> <tr> <td>ASTM E2886</td> <td>2020</td> <td>Standard Test Method for Evaluating the Ability of Exterior Vents to Resist the Entry of Embers and Direct Flame Impingement</td> <td></td> </tr> <tr> <td>UL 263</td> <td>2011 (revised 2022)</td> <td>Fire Tests of Building Construction and Materials</td> <td></td> </tr> <tr> <td>UL 790</td> <td>2022</td> <td>Standard Test Methods for Fire Tests of Roof Coverings</td> <td></td> </tr> </tbody> </table> <p>Please add to section 2 Definitions;:</p>	Document	Date	Title	Section	ASTM E108	2020	Standard Test Methods for Fire Tests of Roof Coverings		ASTM E119	2020	Standard Test Methods for Fire Tests of Building Construction and Materials		ASTM E2886	2020	Standard Test Method for Evaluating the Ability of Exterior Vents to Resist the Entry of Embers and Direct Flame Impingement		UL 263	2011 (revised 2022)	Fire Tests of Building Construction and Materials		UL 790	2022	Standard Test Methods for Fire Tests of Roof Coverings		Reason Statement reduction (environme impact due ever-incre wildfire risl homes and communiti involves defensible space, hor hardening, response planning. Addition of hardening accommod what can b done by designers builders dt the constr phase. Ott modificatio to offer cla and consie between tt other codes/star - Modified feet defen: space bas findings fr IBHS and to pro consistenc other code which are changing t remove all vegetation combustib matter for zone. The "hardscap removed, i definition i 2 includes combustib wood. - Th added hon hardening solutions e based on collaborati research conducted National Ir of Standar Technology (NIST), C/ FIRE, the Insurance Institute fo Business e Home Saf (IBHS). Together, e Hazard Mitigation Methodolo (HMM) wa
Document	Date	Title	Section																									
ASTM E108	2020	Standard Test Methods for Fire Tests of Roof Coverings																										
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UL 790	2022	Standard Test Methods for Fire Tests of Roof Coverings																										



	<p><b>Fire-Smart Vegetation:</b> <i>Plants, shrubs, trees and other vegetation that exhibits properties such as high moisture content, little accumulation of dead vegetation and low sap or resin content, that make them less likely to ignite or contribute heat or spread flame in a fire than native vegetation typically found in the region.</i></p> <p>**apologies, the server is not allowing document uploads, please let me know where/how I can provide supporting documentation.</p> <p><b><u>Supporting Documentation:</u></b></p> <ul style="list-style-type: none"> <li>- Fire smart definition: <ul style="list-style-type: none"> <li>o <a href="https://readyforwildfire.org/prepare-for-wildfire/fire-smart-landscaping/">https://readyforwildfire.org/prepare-for-wildfire/fire-smart-landscaping/</a> (<a href="https://readyforwildfire.org/prepare-for-wildfire/fire-smart-landscaping/">https://readyforwildfire.org/prepare-for-wildfire/fire-smart-landscaping/</a>)</li> <li>o (WUIC61-24 proposal – approved as submitted PDF)</li> <li>o CAH1 Results showing approved as submitted PDF</li> </ul> </li> <li>- No vegetation in 0-5 feet: <ul style="list-style-type: none"> <li>o <a href="https://ibhs.org/wildfireready/">https://ibhs.org/wildfireready/</a> (<a href="https://ibhs.org/wildfireready/">https://ibhs.org/wildfireready/</a>)</li> <li>o IBHS How to Prepare Home PDF</li> <li>o CalFire Wildfire Home Retrofit Guide</li> </ul> </li> <li>- Info sheets/websites about home hardening: <ul style="list-style-type: none"> <li>o <a href="https://readyforwildfire.org/prepare-for-wildfire/hardening-your-home/">https://readyforwildfire.org/prepare-for-wildfire/hardening-your-home/</a> (<a href="https://readyforwildfire.org/prepare-for-wildfire/hardening-your-home/">https://readyforwildfire.org/prepare-for-wildfire/hardening-your-home/</a>)</li> <li>o PDF of IBHS Home Prep</li> <li>o CalFire Wildfire Home Retrofit Guide</li> </ul> </li> <li>- Evidence supporting 6" noncombustible material at base of wall: <ul style="list-style-type: none"> <li>o NIST Technical Note 2205: Item 10 PDF</li> <li>o NIST Guidelines Link (<a href="https://www.nist.gov/el/fire-research-division-73300/wildland-urban-interface-fire-73305/hazard-mitigation-methodology-8">https://www.nist.gov/el/fire-research-division-73300/wildland-urban-interface-fire-73305/hazard-mitigation-methodology-8</a>)</li> <li>o IWUIC11-21 Public Comment 1 – data supporting 6" base requirements</li> <li>o IBHS How to Prepare Home PDF</li> <li>o CalFire Wildfire Home Retrofit Guide</li> </ul> </li> </ul>	<p>developed which had primary gc</p> <p>Protect ho and prope reduce los</p> <p>Prioritize c effective protection. Introduced term "Fire Vegetation aligned an consistent where othe codes (CA Ch.7a, IW ICC-605) e moving, ar provide a r searchable appropriat for builde: properly id wildfire-res vegetative species. o definition i follows: "F Smart Vegetation Plants, shr trees and c-vegetation exhibits properties as high mc content, lit accumulat dead vege and low sa resin conte that make less likely ignite or contribute or spread in a fire th native veg typically fo the region</p>
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8500	CHAPTER 6: RESOURCE EFFICIENCY	604 RECYCLED- CONTENT BUILDING MATERIALS	<p><b>604 Recycled-Content Building Materials</b></p> <p><b>604.2 Concrete-Cementitious Materials</b></p> <p>(1) Use supplementary cementitious materials instead of Portland cement in concrete with not less than the following:</p> <ul style="list-style-type: none"> <li>(a) 20% supplementary cementitious materials (1 point)</li> <li>(b) 30% supplementary cementitious materials (3 points)</li> <li>(c) 40% supplementary cementitious materials (5 points)</li> </ul> <p>(2) Include recycled content aggregate for not less than 10% of aggregate material (1 point)</p> <p>[Points not awarded if point are taken for cementitious material under 604.1]</p> <p>-----</p> <p>Please add the following definition to Chapter 2:</p> <p><b>Cementitious Materials:</b> <u>Materials utilizing hydraulic cement as a primary binder, such as concrete, mortar, grout, manufactured masonry, and fiber-cement.</u></p> <p><b>Supplementary Cementitious Materials:</b> <u>Inorganic materials that, used in combination with Portland or blended cements, contribute to the properties of a cementitious mixture through hydraulic or pozzolanic activity or both.</u></p> <p><b>Supporting Documentation Links:</b></p> <p>American Concrete Institute:  <a href="https://www.concrete.org/topics/concrete/topicdetail/Cementitious%20Material%20in%20Concrete?search=Cementitious%20Material%20in%20Concrete">https://www.concrete.org/topics/concrete/topicdetail/Cementitious%20Material%20in%20Concrete?search=Cementitious%20Material%20in%20Concrete</a>          (https://www.concrete.org/topics/concrete/topicdetail/Cementitious%20Material%20in%20Concrete?search=Cementitious%20Material%20in%20Concrete)</p> <p>U.S. DOT Tech Brief – Supplementary Cementitious Materials:  <a href="https://www.fhwa.dot.gov/pavement/concrete/pubs/hif16001.pdf">https://www.fhwa.dot.gov/pavement/concrete/pubs/hif16001.pdf</a>          (https://www.fhwa.dot.gov/pavement/concrete/pubs/hif16001.pdf)</p> <p>Portland Cement Association - <a href="https://www.cement.org/cement-concrete/concrete-materials/supplementary-cementing-materials">https://www.cement.org/cement-concrete/concrete-materials/supplementary-cementing-materials</a> (https://www.cement.org/cement-concrete/concrete-materials/supplementary-cementing-materials)</p> <p>NRMCA Brief CIP 30 – Supplementary Cementitious Materials - <a href="https://alconcrete.org/wp-content/downloads/cip/30p.pdf">https://alconcrete.org/wp-content/downloads/cip/30p.pdf</a> (https://alconcrete.org/wp-content/downloads/cip/30p.pdf)</p> <p>Iowa State University: <a href="https://cptechcenter.org/cementitious-materials/">https://cptechcenter.org/cementitious-materials/</a>          (https://cptechcenter.org/cementitious-materials/)</p>	Cementitic materials r accurately describes family of products w currently u Portland c concrete b one; maso mortar, grc manufactu masonry a fiber-ceme being som others.
8502	CHAPTER 10: OPERATION, MAINTENANCE, AND BUILDING OWNER EDUCATION	1001.1 Homeowner's manual	<p><b>1001.1 Homeowners Manual</b></p> <p>(27) For homes in areas designated as a wildland-urban interface or other wildfire-prone areas, information is included on how defensible space, <u>and the home in general</u>, is maintained to help the home be resilient to wildfires.</p>	It is import add inform on how to protect bui from wildfi even if pra were not originally c claim poin' Simple ste such as ch leaf-litter a dead bran from arou house, reg cleaning g regularly cleaning a beneath d; fixing brok siding, kee trees and : trimmed, a many mor things can prevent da

8503	CHAPTER 10: OPERATION, MAINTENANCE, AND BUILDING OWNER EDUCATION	1002.3 Maintenance manual	<b>1002.3 Maintenance manual</b> (14) A maintenance plan to preserve the defensible space, <u>and the building in general</u> , for wildfire resilience (only allowable when points for 505.12 Wildfire resilience are claimed)	It is import add inform on how to maintain a protect bui from wildfi Simple (bu always do maintenanc steps such clearing le and dead branches f around the house, reg cleaning g regularly cleaning a beneath d fixing brok siding, kee tress and trimmed, a many mor things can prevent da
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Return to the Public Comment Submission Form Login Page (Comments.aspx).  
 Return to the National Green Building Standard page on HomeInnovation.com  
 (<https://www.HomeInnovation.com/ngbs>)

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Questions should be submitted to [standards@HomeInnovation.com](mailto:standards@HomeInnovation.com) (mailto:standards@HomeInnovation.com).



PC245- 902.3 Radon testing and mitigation

**902.3 Radon testing and mitigation.** Radon Zones are identified by the AHJ or, where the zone is not identified by the AHJ, as defined in Figure 9(1).

~~*[Mandatory except for an existing building that has been tested for radon and is in accordance with federal and local acceptable limits.]*~~

**Mandatory**

**902.3.1 Radon testing.** Radon testing is mandatory for Zone 1.

**Exceptions:** 1) Testing is not mandatory where the authority having jurisdiction has defined the radon zone as Zone 2 and 3; and 2) testing is not mandatory where the occupied space is located above an unenclosed open space or concrete podiums.

(1) Single-family testing specifications. Single-family testing is performed as specified in (a) through (j). Testing of a representative sample shall be permitted for multifamily buildings only.

**8**

(a) Testing is performed after the residence passes its airtightness test.

(b) Testing is performed after the radon control system installation is complete. If the system has an active fan, the residence shall be tested with the fan operating.

(c) Testing is performed at the lowest level within a dwelling unit which will be occupied, even if the space is not finished.

(d) Testing is not performed in a closet, hallway, stairway, laundry room, furnace room, kitchen, or bathroom.

(e) Testing is performed with a commercially available test kit or with a continuous radon monitor that can be calibrated. Testing shall be in accordance with the testing device manufacturer's instructions.

(f) Testing shall be performed by the builder, a registered design professional, or an approved third party.

(g) Testing shall extend not less than 48 hours or to the minimum specified by the manufacturer, whichever is longer.

(h) Written radon test results shall be provided by the test lab or testing party. Written test results shall be included with construction documents.

(i) An additional pre-paid test kit shall be provided for the homeowner to use when they choose. The test kit shall include mailing or emailing the results from the testing lab to the homeowner.

(j) Where the radon test result is 4 pCi/L or greater, the fan for the radon vent pipe shall be installed. The system shall be modified and retested until the test result is less than 4 pCi/L.

(2) Multifamily testing specifications. Multifamily testing is performed as specified in (a) through (i)..

**8 for 100%  
testing of  
ground-  
contact  
units/areas**  
  
**6 for 25%  
sampling of  
ground  
contact  
units/areas  
(Zone 2 and  
3 only)**

(a) ~~For Zone 1,~~ Each ground-contact dwelling or living sleeping unit, a test is performed in the lowest level that serves or could serve as a living area, sleeping quarters, office, playroom or otherwise be occupied for residential use at some time in the future. ~~Apply a 25% sampling of units or at least one of each unit type- whichever is greater, for Zone 2 buildings.~~ There should be representative samples across the footprint of the building.

(b) For ~~non-residential~~ ground-contact ~~amenity areas locations,~~ a test is performed in all ~~ground-contact rooms, offices, classrooms and other general use~~ areas that are occupied or intended to be occupied. ~~Apply a 25% sampling of spaces for Zone 2 buildings.~~ There should be representative samples across the footprint of the building.

(c) On each upper floor, testing is performed in at least one, and not less than 10%, of all dwellings and nonresidential rooms that are occupied or intended to be occupied. These measurements shall be in addition to tests performed in ground-contact locations and rooms or dwellings that adjoin immediately above untested ground-contact locations.

(d) Testing is not performed in hallways, closets, and bathroom or shower areas unless they are open to other rooms that are occupied for other purposes.

(e) Testing is performed with a commercially available test kit or with a continuous radon monitor that can be calibrated. Testing shall be in accordance with the testing device manufacturer's instructions.

(f) Testing shall be performed by the builder, a registered design professional, or an approved third party.

(g) Testing shall extend not less than 48 hours or to the minimum specified by the manufacturer, whichever is longer.

(h) Written radon test results shall be provided by the test lab or testing party. Written test results shall be included with construction documents.

(i) Where any radon test result is 4 pCi/L or greater, fan(s) for the radon vent pipe shall be installed. The system shall be modified, and the entire building retested until the test result is less than 4 pCi/L.

(3) Testing results. A radon test done in accordance with 902.3.1(1) or 902.3.1(2) and completed before occupancy receives a result of 2 pCi/L or less.

6

**902.3.2 Radon reduction measures.** Radon reduction measures are in accordance with IRC Appendix AF Radon Control Methods, ANSI/AARST MA-MFLB, or § 902.3.1.

(1) Buildings located in Zone 1

(a) a passive radon system is installed

**Mandatory**

*Mandatory for existing building with conditioned space over a new ground supported slab. An existing building that has been tested for radon and is in accordance with federal and local acceptable limits would be exempted from this requirement.*

(b) an active radon system is installed

**12**

(2) Buildings located in Zone 2 or Zone 3

(a) a passive radon system is installed

**6**

(b) an active radon system is installed

**12**

**902.3.3 Radon reduction option.** This option requires § 902.3.3.1 through § 902.3.3.7.  
*[Mandatory when selected for compliance]*

**Mandatory\***

**902.3.3.1 Soil gas barriers and base course.** A base course in accordance with IRC Appendix F Section 103.2 shall be installed below slabs and foundations. There shall be a continuous gas-permeable base course under each soil-gas retarder that is separated by foundation walls or footings. Between slabs and the base course, install a soil-gas retarder compliant with § 602.1.1.1 and IRC Appendix F Section 103.

**902.3.3.2 Soil gas collection.** There shall be an unobstructed path for soil gas flow between the void space installed in the base course and the vent through the roof. Soil gases below the foundation shall be collected by a perforated pipe with a diameter of not less than 4 in. (10 cm) and not less than 5 ft (1.5 m) in total length. A tee fitting or equivalent method shall provide two horizontal openings to the radon collection. The tee fitting shall be designed to prevent clogging of the radon collection path. Alternately the soil gas collection shall be by approved radon collection mats or an equivalent approved method.

**902.3.3.3 Soil gas entry routes.** Openings in slabs, soil-gas retarders, and joints such as, but not limited to, plumbing, ground water control systems, soil-gas vent pipes, piping and structural supports, shall be sealed against air leakage at the penetrations. The sealant shall be a polyurethane caulk, expanding foam or other approved method. Foundation walls shall comply with IRC Section 103.2.3. Sumps shall be sealed in accordance with IRC Section 103.2.2. Sump pits and sump lids intended for ground water control shall not be connected to the sub-slab soil-gas exhaust system.

**902.3.3.4 Soil gas vent.** A gas-tight pipe vent shall extend from the soil gas permeable layer through the roof. The vent pipe size shall not be reduced at any location as it goes from gas collection to the roof. Exposed and visible interior vent pipes shall be identified with not less than one label reading “Radon Reduction System” on each floor and in habitable attics.

**902.3.3.5 Vent pipe diameter.** The minimum vent pipe diameter shall be as specified in Table 902.3.2.5.

**Table 902.3.3.5  
Maximum Vented Foundation Area**

<b>Maximum area vented</b>	<b>Nominal pipe diameter</b>
2,500 ft <sup>2</sup> (232 m <sup>2</sup> )	3 in. (7.6 cm)
4,000 ft <sup>2</sup> (372 m <sup>2</sup> )	4 in. (10 cm)
Unlimited	6 in. (15.2 cm)

**902.3.3.6 Multiple vented areas.** In dwellings where interior footings or other barriers separate the soil-gas permeable layer, each area shall be fitted with an individual vent pipe.



Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

**902.3.3.7 Fan.** Each sub-slab soil-gas exhaust system shall include a fan, or dedicated space for the post-construction installation of a fan. The electrical supply for the fan shall be located within 6 ft (1.8 m) of the fan. Fan is not required to be on a dedicated circuit.

**11.902.3 Radon testing and mitigation.** Radon Zones are identified by the AHJ or, where the zone is not identified by the AHJ, as defined in Figure 9(1).

~~{Mandatory except for an existing building that has been tested for radon and is in accordance with federal and local acceptable limits.}~~ .....

**Mandatory**

**11.902.3.1 Radon testing.** Radon testing is mandatory for Zone 1.

**Exceptions:** 1) Testing is not mandatory where the authority having jurisdiction has defined the radon zone as Zone 2 and 3; and 2) testing is not mandatory where the occupied space is located above an unenclosed open space or concrete podiums.

- (1) Single-family testing specifications. Single-family testing is performed as specified in (a) through (j). Testing of a representative sample shall be permitted for multifamily buildings only. .... **8**
  - (a) Testing is performed after the residence passes its airtightness test.
  - (b) Testing is performed after the radon control system installation is complete. where the system has an active fan, the residence shall be tested with the fan operating.
  - (c) Testing is performed at the lowest level within a dwelling unit which will be occupied, even if the space is not finished.
  - (d) Testing is not performed in a closet, hallway, stairway, laundry room, furnace room, kitchen, or bathroom.
  - (e) Testing is performed with a commercially available test kit or with a continuous radon monitor that can be calibrated. Testing shall be in accordance with the testing device manufacturer’s instructions.
  - (f) Testing shall be performed by the builder, a registered design professional, or an approved third party.
  - (g) Testing shall extend not less than 48 hours or to the minimum specified by the manufacturer, whichever is longer.
  - (h) Written radon test results shall be provided by the test lab or testing party. Written test results shall be included with construction documents.
  - (i) An additional pre-paid test kit shall be provided for the homeowner to use when they choose. The test kit shall include mailing or emailing the results from the testing lab to the homeowner.
  - (j) Where the radon test result is 4 pCi/L or greater, ~~the fan for the radon vent pipe~~ a radon mitigation system shall be installed. The system shall be modified and retested until the test result is less than 4 pCi/L.

- (2) Multifamily testing specifications. Multifamily testing is performed as specified in (a) through (i). **8 for 100% testing of ground-contact units/areas**

**6 for 25%  
sampling of  
ground-  
contact  
units/areas  
(Zone 2 and  
3 only)**

- (a) ~~For Zone 1,~~ Each ground-contact dwelling or living sleeping unit, a test is performed in the lowest level that serves or could serve as a living area, sleeping quarters, office, playroom or otherwise be occupied for residential use at some time in the future. ~~Apply a 25% sampling of units or at least one of each unit type- whichever is greater, for Zone 2 buildings.~~ There should be representative samples across the footprint of the building.
  - (b) For ~~non-residential~~ ground-contact ~~amenity areas locations~~, a test is performed ~~in all locations all ground-contact rooms, offices, classrooms and other general use areas~~ that are occupied or intended to be occupied. ~~Apply a 25% sampling of spaces for Zone 2 buildings.~~ There should be representative samples across the footprint of the building.
  - (c) On each upper floor, testing is performed in at least one, and not less than 10%, of all dwellings and nonresidential rooms that are occupied or intended to be occupied. These measurements shall be in addition to tests performed in ground-contact locations and rooms or dwellings that adjoin immediately above untested ground-contact locations.
  - (d) Testing is not performed in hallways, closets, and bathroom or shower areas unless they are open to other rooms that are occupied for other purposes.
  - (e) Testing is performed with a commercially available test kit or with a continuous radon monitor that can be calibrated. Testing shall be in accordance with the testing device manufacturer’s instructions.
  - (f) Testing shall be performed by the builder, a registered design professional, or an approved third party.
  - (g) Testing shall extend not less than 48 hours or to the minimum specified by the manufacturer, whichever is longer.
  - (h) Written radon test results shall be provided by the test lab or testing party. Written test results shall be included with construction documents.
  - (i) Where any radon test result is 4 pCi/L or greater, fan(s) for the radon vent pipe shall be installed. The system shall be modified, and the entire building retested until the test result is less than 4 pCi/L.
- (3) Testing results. A radon test done in accordance with § 11.902.3.1(1) or 902.3.1(2) and completed before occupancy receives a result of 2 pCi/L or less..... **6**

**11.902.3.2 Radon reduction measures.** Radon reduction measures are in accordance with ~~IRC Appendix AF Radon Control Methods~~, ANSI/AARST SGM-MFLB, ANSI/AARST SGM-SF, or § 11.902.3.1.

- (1) Buildings located in Zone 1
  - (a) a passive radon system is installed .....

**Mandatory  
for existing  
building with  
conditioned  
space over a  
new ground  
supported  
slab. An  
existing  
building that  
has been  
tested for  
radon and is  
in  
accordance  
with federal  
and local  
acceptable  
limits would  
be exempted  
from this  
requirement**

\*

(b) an active radon system is installed..... 12

(2) Buildings located in Zone 2 or Zone 3

(a) a passive or active radon system is installed..... 6

(b) an active radon system is installed..... 12

**11.902.3.3 Radon reduction option.** This option requires § 11.902.3.3.2 through § 11.902.3.3.7.

**Mandatory**

**11.902.3.3.2 Soil gas collection.** There shall be an unobstructed path for soil gas flow between the void space installed in the base course and the vent through the roof. Soil gases below the foundation shall be collected by a perforated pipe with a diameter of not less than 4 in. (10 cm) and not less than 5 ft (1.5 m) in total length. A tee fitting or equivalent method shall provide two horizontal openings to the radon collection. The tee fitting shall be designed to prevent clogging of the radon collection path. Alternately the soil gas collection shall be by approved radon collection mats or an equivalent approved method.

**11.902.3.3.3 Soil gas entry routes.** Openings in slabs, soil-gas retarders, and joints such as, but not limited to, plumbing, ground water control systems, soil-gas vent pipes, piping and structural supports, shall be sealed against air leakage at the penetrations. The sealant shall be a polyurethane caulk, expanding foam or other approved method. Foundation walls shall comply with IRC Section 103.2.3. Sumps shall be sealed in accordance with IRC Section 103.2.2. Sump pits and

sump lids intended for ground water control shall not be connected to the sub-slab soil-gas exhaust system.

**11.902.3.3.4 Soil gas vent.** A gas-tight pipe vent shall extend from the soil gas permeable layer through the roof. The vent pipe size shall not be reduced at any location as it goes from gas collection to the roof. Exposed and visible interior vent pipes shall be identified with not less than one label reading “Radon Reduction System” on each floor and in habitable attics.

**11.902.3.3.5 Vent pipe diameter.** The minimum vent pipe diameter shall be as specified in Table 11.902.3.2.5.

**Table 11.902.3.3.5  
Maximum Vented Foundation Area**

<b>Maximum area vented</b>	<b>Nominal pipe diameter</b>
2,500 ft <sup>2</sup> (232 m <sup>2</sup> )	3 in. (7.6 cm)
4,000 ft <sup>2</sup> (372 m <sup>2</sup> )	4 in. (10 cm)
Unlimited	6 in. (15.2 cm)

**11.902.3.3.6 Multiple vented areas.** In dwellings where interior footings or other barriers separate the soil-gas permeable layer, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

**11.902.3.3.7 Fan.** Each sub-slab soil-gas exhaust system shall include a fan, or dedicated space for the post-construction installation of a fan. The electrical supply for the fan shall be located within 6 ft (1.8 m) of the fan. Fan is not required to be on a dedicated circuit.

*Addition for Chapter 14 Reference Standards:*

<b>DOCUMENT</b>	<b>DATE</b>	<b>TITLE</b>	<b>SECTION</b>
<a href="#">ANSI/AARST SGM-SF</a>	<a href="#">2023</a>	<a href="#">Soil Gas Mitigation Standards for Existing Homes</a>	<a href="#">11.902.3.2</a>

PC264- Chapter 11- Overall

# CHAPTER 3: COMPLIANCE METHOD

## 301 GENERAL

**301.1 Environmental rating levels.** The building, project, site, and/or development environmental rating level shall consist of all mandatory requirements plus points assessed using the point system specified within this chapter. The rating level shall be in accordance with § 302, § 303, § 304, or § 305, as applicable. The designation for accessory structures shall be in accordance with § 306.

**301.1.1 Non-residential spaces.** Non-residential spaces in mixed-use buildings shall comply with Chapter 13 (Commercial Spaces) of this Standard or IgCC § 501.3.7.2 and Chapters 6-10, excluding § 601.3.1.

**301.2 Awarding of points.** Points shall be awarded as follows:

- (1) The maximum number of points that can be awarded for each practice is noted with that practice.
- (2) Point allocation for multifamily buildings shall be as prescribed in § 304.
- (3) The Adopting Entity shall allow the use of new and innovative products and practices deemed to comply with the intent of this Standard. Points assigned for any new product or practice shall be determined by the Adopting Entity. The Adopting Entity shall award no more than 20 points for such products or practices. Point values shall be determined by comparing the innovative product or practice to a product or practice already described in the Standard. The applicant shall supply demonstrable, quantified data to support the innovative product or practice and to determine the practice's functional equivalent in the Standard for the points to be awarded.

## 302 GREEN SUBDIVISIONS

**302.1 Site design and development.** The threshold points required for the environmental rating levels to qualify a new or existing subdivision as green under this Standard shall be in accordance with Table 302 and based on points in Chapter 4.

**302.1.1** Site design and development obtaining thresholds in Table 302 are permitted to be verified, certified, and marketed as such prior to the verification of green buildings.

**302.1.2** Developments are permitted to be marketed as a green subdivision. Developer shall provide clear explanation that the rating only applies to the development and not the buildings.

## 303 GREEN BUILDINGS

**303.1 Compliance options.** The criteria for new buildings shall be in accordance with § 303.2 for residential buildings, the residential portion of mixed-use buildings, or mixed-use buildings or § 303.3 for compliance for single-family homes, townhomes, and duplexes.

**303.2 Buildings.** The threshold points required for the environmental rating levels for a green building shall be in accordance with Table 303. To qualify for one of these rating levels, all of the following shall be satisfied:

- (1) The threshold number of points, in accordance with Table 303, shall be achieved as prescribed in Categories 1 through 6. The lowest level achieved in any category shall determine the overall rating level achieved for the building.
- (2) In addition to the threshold number of points in each category, all mandatory provisions of each category shall be implemented.

**Table 302  
Threshold Point Ratings for Site Design and Development**

Green Subdivision Category		Rating Level Points			
		One Star	Two Stars	Three Stars	Four Stars
Chapter 4	Site Design and Development	95	122	149	176



**Table 303**  
**Threshold Point Ratings for Green Buildings**

Green Building Categories			Rating Level Points <sup>(a) (b)</sup>			
			BRONZE	SILVER	GOLD	EMERALD
1.	<b>Chapter 5</b>	Lot Design, Preparation, and Development	50	64	93	121
2.	<b>Chapter 6</b>	Resource Efficiency	43	59	89	119
3.	<b>Chapter 7</b>	Energy Efficiency	30	45	60	70
4.	<b>Chapter 8</b>	Water Efficiency	25	39	67	92
5.	<b>Chapter 9</b>	Indoor Environmental Quality	25	42	69	97
6.	<b>Chapter 10</b>	Operation, Maintenance, and Building Owner Education	8	10	11	12
7.		Additional Points from Any Category	50	75	100	100
<b>Total Points:</b>			<b>231</b>	<b>334</b>	<b>489</b>	<b>611</b>

(a) In addition to the threshold number of points in each category, all mandatory provisions of each category shall be implemented.

(b) For dwelling units greater than 4,000 ft<sup>2</sup> (372 m<sup>2</sup>), the number of points in Category 7 (Additional Points from Any Category) shall be increased in accordance with § 601.1. The "Total Points" shall be increased by the same number of points.

- (3) In addition to the threshold number of points prescribed in Categories 1 through 6 (which corresponds to Chapters 5-10), the additional points prescribed in Category 7 shall be achieved from any of the categories. Where deemed appropriate by the Adopting Entity based on regional conditions, additional points from Category 7 may be assigned to another category (or categories) to increase the threshold points required for that category (or categories). Points shall not be reduced by the Adopting Entity in any of the six other categories.

Exception: Where the builder is unable to control a majority of items in Chapter 5 due to timing and lack of relationship to the Lot Design, Preparation, and Development, green ratings on the home are permitted to be obtained by eliminating rating requirements and points from Chapter 5. Rating threshold requirements are permitted to be adjusted accordingly. Builders shall provide evidence of this impossibility to the Adopting Entity and provide disclaimer statement on marketing materials when this occurs.

**303.3 Single-family homes, townhomes, and duplexes.** Single-family homes, townhomes, and duplexes complying with all applicable requirements of Chapter 12 shall be deemed Certified.

## 304 GREEN MULTIFAMILY BUILDINGS

**304.1 Multifamily buildings.** All residential portions of a building shall comply with the requirements of this Standard. Partial compliance shall not be allowed. Unless specifically addressed in other portions of this standard, all dwelling and sleeping units and residential common areas within a multifamily building shall comply with all mandatory requirements. Where features similar to dwelling unit/sleeping unit features are installed in the common area, those features shall comply with the standard of the dwelling and sleeping units. Green building practices for residential common areas may differ from requirements for dwelling units/sleeping units. Points for the green building practices that apply to multiple units shall be credited once for the entire building. Where points are credited, including where a weighted average is used, practices shall be implemented in all dwelling and sleeping units, as applicable. Where application of a prescribed practice allows for a different number of points for different dwelling and sleeping units in a multifamily building, the fewer number of points shall be awarded, unless noted that a weighted average is used.

**304.2 Alternative IgCC compliance.** As an alternative, any multifamily or mixed-use building that complies with the IgCC shall be designated as achieving the gold rating level. Additionally, acceptable air tightness of individual residential units shall be demonstrated by a blower door test. The testing and

sampling procedure shall be in accordance with the ENERGY STAR Multifamily High Rise Program Testing and Verification Protocols, Version 1.0, Revision 03 - 2015, with an allowable leakage not greater than 0.3 cfm/sf of enclosure bounding the apartment at an induced pressure difference of 50 pascals.

## 305 EXISTING BUILDING

**305.1 Compliance.** Compliance with § 305 shall be voluntary unless specifically adopted as mandatory by the Adopting Entity.

### 305.2 Whole-building rating criteria

**305.2.1 Applicability.** The provisions of § 305.2 shall apply to existing buildings. In addition to the foundation, not less than 50% of the structural systems of the existing building shall remain in place after any remodeling activities for the building to be eligible for compliance under § 305.2. Eligible projects shall have their Certificate of Occupancy not less than 12 months prior to NGBS registration.

**305.2.1.1 Additions.** For an existing building that includes an addition, the entire building including the addition shall comply with the criteria of § 305.2. The total above-grade conditioned area added during a remodel shall not exceed 75% of the existing building's above-grade conditioned area. For multifamily buildings, the above-grade conditioned area shall be based on the entire building including all dwelling units/sleeping units and common areas. EXCEPTION: Historic buildings are exempt from the 75% limitation.

**305.2.2 Rating scope.** The building rating achieved under § 305.2 and the associated compliance criteria apply to the entire building after the remodel including any additions.

**305.2.3 Mandatory practices.** Additions, alterations or repairs to an existing building, building system or portion thereof shall comply with the Mandatory requirements of Chapter 11. Unaltered portions of the existing building shall not be required to comply with Mandatory requirements except when life safety or visible moisture issues exist.

**305.2.4 Rating level.** A minimum rating level of Bronze shall be achieved in each of the following categories: Energy efficiency (§ 305.2.5), Water efficiency (§ 305.2.6), and Prescriptive practices (§ 305.2.7). The building rating level shall be the lowest rating level achieved in § 305.2.5, § 305.2.6, or § 305.2.7.

**305.2.5 Energy efficiency.** The building shall comply with [§ 11.701.1 and the compliance requirements of Table 305.2.5, § 305.2.5.1 or § 305.2.5.2 or § 305.2.5.3.](#)

**305.2.5.1 Energy consumption reduction path.** The energy efficiency rating level shall be based on the reduction in energy consumption resulting from the remodel in accordance with [Table 305.2.5.1.](#)

The reduction in energy consumption resulting from the remodel shall be based on the estimated annual energy cost savings, site energy savings, source energy savings, or carbon dioxide equivalent emissions (CO<sub>2</sub>e) savings using methodology in ANSI/ASHRAE Standard 105 or IgCC or equivalent. The reduction shall be the percentage difference between the consumption per square foot before and after the remodel calculated as follows:

$$\frac{\{\text{consumption per square foot before remodel} - \text{consumption per square foot after remodel}\}}{\text{consumption per square foot before remodel}} \times 100$$

The occupancy and lifestyle assumed and the method of making the energy consumption estimates shall be the same for estimates before and after the remodel. The building configuration for the after-remodel estimate shall include any additions to the building or other changes to the configuration of the conditioned space. For multifamily buildings, the energy consumption shall be based on the entire building including all dwelling units/sleeping units and common areas:

If a building can demonstrate through documentation approved by the Adopting Entity that the remodel activities started prior to project registration, the energy baseline (consumption per square foot before remodel) can be calculated based on data and building systems that were existing in the building up to 3 years prior project registration.

**305.2.5.2 New Construction Equivalency path.** The building shall comply with § 11.701 Minimum Energy Efficiency Requirements and Table 305.2.5.2 (Energy Point Thresholds). Any practice listed in either § 11.702 (Performance Path), § 11.703 (Prescriptive Path), or 704 (ERI Target Path) shall be eligible for contributing points toward Table 305.2.5.2 (Energy Point Thresholds). The attributes of the existing building that were in compliance with § 11.702 through § 11.704 prior to certification and remain in compliance when submitting for certification shall be eligible for contributing points to this section.

A building complying with § 305.2.5.2 New Construction Equivalency Path shall obtain not less than 30 points from § 11.702, § 11.703, or § 11.704 and include not less than two practices from § 11.705 or not less than one practice from § 11.705 and one practice from § 11.706.

Points earned in § 11.705 and § 11.706 contribute to the energy points in Table 305.2.5.2 and support earning a higher certification level. Points from § 11.702 through § 11.706 do not count towards the required points in Table 305.2.7.

**305.2.5.3 EPA ENERGY STAR Score.** The Multifamily or mixed-use property shall be scored in the EPA ENERGY STAR Portfolio Manager tool following EPA requirements and guidance or equivalent tool or program. This score is based on actual energy usage

**Table 305.2.5.1**  
**Energy Compliance Reduction Level Thresholds**

	Rating Level			
	BRONZE	SILVER	GOLD	EMERALD
Reduction in energy consumption	15%	25%	35%	45%
EPA ENERGY STAR Score	75-84	85-94	95+	N/A
Performance Path Points	30	45	60	70
Prescriptive Path Points	30	45	60	70
ERI Target Path Points	30	45	60	70
Tropical Zone Path Points	N/A	45	60	N/A

**Table 305.2.5.2**  
**Energy Points Thresholds**

	Rating Level			
	BRONZE	SILVER	GOLD	EMERALD
Section 11.700 new construction equivalency thresholds	30	45	60	70
<i>Points from § 11.702 through § 11.706 shall not count towards the total points for § 305.2.7.</i>				

**Table 305.2.5.3**  
**EPA ENERGY STAR Score**

	Rating Level			
	BRONZE	SILVER	GOLD	EMERALD
EPA ENERGY STAR Score	75-84	85-94	95+	N/A

data. The last month in the 12-month energy data period for this energy score shall be within 6 months prior to acceptance by the Adopting Entity. Where total property energy data is not available, then the score can be generated with 100% actual common and non-residential area energy usage and not less than 80% of the actual resident energy meters which has been extrapolated to 100%. All energy data and extrapolation methods shall be reported. The level awarded for the energy chapter is based on Table 305.2.5.3.

Notwithstanding the above requirements, projects that have an energy score of 65-75 shall achieve Bronze-level certification by implementing energy efficiency measures (EEM) that will improve the energy score to a level above 75. All of the EEMs shall be completed and verified before submission to the Adopting Entity. All energy data, energy modeling, and the forecasted energy score shall be submitted to the Adopting Entity.

**305.2.6 Water efficiency.** The building shall comply with § 11.801.1 and the requirements of Table 305.2.6.305.2.6.1 or § 305.2.6.2 or § 305.2.6.3. The attributes of the existing building that were in compliance with § 11.802 through § 11.804 prior to certification and remain in compliance when submitting for certification shall be eligible for contributing points to this section.

**305.2.6.1 Water consumption reduction path.** The water efficiency rating level shall be based on the

reduction in water consumption resulting from the remodel in accordance with Table 305.2.6.1.

Water consumption shall be based on the estimated annual use as determined by a third-party audit and analysis or use of utility consumption data. The reduction shall be the percentage difference between the consumption before and after the remodel calculated as follows:

$$\frac{\{(\text{consumption per bedroom before remodel} - \text{consumption per bedroom after remodel}) / \text{consumption per bedroom before remodel}\} \times 100\%}{}$$

The occupancy and lifestyle assumed and the method of making the water consumption estimates shall be the same for estimates before and after the remodel. The building configuration for the after-remodel estimate shall include any changes to the configuration of the building such as additions or new points of water use. For multifamily buildings, the water consumption shall be based on the entire building including all dwelling units and common areas:

Where a building can demonstrate through documentation approved by the Adopting Entity that the remodel activities started prior to project registration, the water baseline (consumption before remodel) shall be calculated based on data and building systems that existed in the building up to 3 years prior project registration.

**Table 305.2.6.1  
Water Compliance Reduction Level Thresholds**

	Rating Level			
	BRONZE	SILVER	GOLD	EMERALD
Reduction in water consumption	20%	30%	40%	50%
EPA Water Score	75-84	85-94	95+	N/A
Prescriptive Path Points	25	39	67	92
Performance Path – Water Rating Index Score	61-70	51-60	41-50	40 and below

**Table 305.2.6.2  
Water Point Thresholds**

	Rating Level			
	BRONZE	SILVER	GOLD	EMERALD
Section 11.800 new construction equivalency thresholds	25	39	67	92
<i>Points from § 11.802 through § 11.804 shall not count toward the total points for § 305.2.7.</i>				

**Table 305.2.6.3  
EPA Water Score**

	Rating Level			
	BRONZE	SILVER	GOLD	EMERALD
EPA Water Score	75-84	85-94	95+	N/A

**305.2.6.2. New construction water equivalency path.** The building shall comply with New Construction Water Equivalency Table 305.2.6.2 (Water Point Thresholds). Any practice listed in either § 11.802 (Prescriptive Path) and § 11.803 (Innovative Practices); or § 11.804 (Performance Path) shall be eligible for contributing points toward Table 305.2.6.2 (Water Point Thresholds). The attributes of the existing building that were in compliance with § 11.802 through § 11.804 prior to certification and remain in compliance when submitting for certification shall be eligible for contributing points to this section.

A building complying with § 305.2.6.2 New Construction Water Equivalency Path shall obtain not less than 25 points from § 11.802 and § 11.803, or § 11.804.

Points from § 11.802 through § 11.804 do not count towards the required points in Table 305.2.7.

**305.2.6.3 EPA water Score.** The Multifamily property shall be scored in the EPA ENERGY STAR Portfolio Manager tool following EPA requirements and guidance or equivalent tool or program. The last month in the 12-month water data period for this water score shall be within 6 months prior to acceptance by the Adopting Entity. Where total property water data is not available, then the score can be generated with 100% actual common and non-residential area water usage and not less than 80% of the actual tenant water meters, which has been extrapolated to 100%. All water data and extrapolation methods shall be reported. The level awarded for the Water Section shall be based on Table 305.2.6.3.

**305.2.7 Prescriptive practices.** The point thresholds for the environmental rating levels based on compliance with the Chapter 11 prescriptive practices shall be in accordance with Table 305.2.7. Any practice listed in Chapter 11, except for § 11.701 through § 11.706 and § 11.801 through § 11.803 shall be eligible for contributing points to the prescriptive threshold ratings. The attributes of the existing building that were in compliance with the prescriptive practices of Chapter 11 prior to the remodel and remain in compliance after the remodel shall be eligible for contributing points to the prescriptive threshold ratings.

## 305.3 Multifamily property level green certification

**305.3.1** Multifamily Properties with multiple buildings shall qualify for a single property-level green certification by following the practices of 305.2.

*Building Types:* Property-wide certifications shall specify the buildings that are included in the certification. Multifamily amenity buildings, such as clubhouse, fitness center and leasing offices shall be included in the property wide certification. Garage-only structures and smaller unconditioned structures, such as, but not limited to, maintenance sheds, or mail kiosks, shall be excluded. Commercial or retail space is permitted to be included or excluded from the green certification. Where commercial space is to be included, it shall comply with the requirements from Chapter 13 relevant for existing buildings.

**305.3.2 Rating scope.** The building rating achieved under § 305.3 and the associated compliance criteria apply to the entire property after the remodel, including any additions.

**305.3.3 Mandatory practices.** Additions, alterations, or repairs to any buildings, building system, or portion thereof shall comply with the Mandatory requirements of Chapter 11. Unaltered portions of the existing buildings shall not be required to comply with Mandatory requirements except where life, safety, or visible moisture issues exist.

**305.3.4 Rating level.** A rating level of Bronze or higher shall be achieved in each of the following categories: Energy efficiency (§ 305.2.5), Water efficiency (§ 305.2.6), and Prescriptive practices (§ 305.2.7), as applied across all the buildings in the property. Practices related to 305.2.7 shall be awarded to all buildings on the property based on the lowest point level achieved by any one building. The property rating level shall be the lowest rating level achieved in § 305.2.5, § 305.2.6, or § 305.2.7.

## 306 GREEN ACCESSORY STRUCTURES

**306.1 Applicability.** The designation criteria for accessory structures shall be in accordance with Appendix C.

**306.2 Compliance.** Compliance with Appendix C shall be voluntary unless specifically adopted as mandatory. Where specifically adopted, the adopting entity shall establish rules for compliance with Appendix C.

**Table 305.2.7  
Prescriptive Threshold Point Ratings**

	Rating Level			
	<b>BRONZE</b>	<b>SILVER</b>	<b>GOLD</b>	<b>EMERALD</b>
Chapter 11 prescriptive thresholds	88	125	181	225

## COMPLIANCE METHOD

*Preceding sections of Chapter 11 remain unchanged*

## 11.701 MINIMUM ENERGY EFFICIENCY REQUIREMENTS

**STAFF NOTE:** Language from A009 and A010, that was Accepted As Modified by the Consensus Committee at their November 8-10, 2022 meeting, was not fully incorporated into the first draft standard but is included in this draft standard.

**11.701.1 Mandatory requirements.** The building shall comply with one of the following:

- (1) § 11.701.1.1 (Energy Consumption Reduction Path),
- (2) § 11.701.1.2 (EPA ENERGY STAR Score),
- (3) §11.702 (Performance Path),
- (4) § 11.703 (Prescriptive Path), § 11.704 (ERI Target Path), or
- (5) § 11.705 (Tropical Zone) one of the pathways in § 11.701.1.4 through § 11.701.1.8 (Alternative Paths).

Items listed as “mandatory” in § 11.701.4 shall apply to § 11.702, § 11.703, and § 11.704 paths. Except where otherwise noted, buildings in the Tropical Climate Zone shall comply with Climate Zone 1 requirements.

**11.701.1.1 Energy Consumption Reduction Path requirements.** The energy efficiency rating shall be based on the reduction in energy consumption resulting from the remodel be in accordance with Table 305.2.5.1.

The reduction in energy consumption resulting from the remodel shall be based on the estimated annual energy cost savings, site energy savings, source energy savings, or carbon dioxide equivalent emissions (CO<sub>2</sub>e) savings using methodology in ANSI/ASHRAE Standard 105 or IgCC or equivalent. The reduction shall be the percentage difference between the consumption per square foot before and after the remodel calculated as follows:

$$\frac{[(\text{consumption per square foot before remodel} - \text{consumption per square foot after remodel}) / \text{consumption per square foot before remodel}] * 100}{}$$

The occupancy and lifestyle assumed and the method of making the energy consumption estimates shall be the same for estimates before and after the remodel. The building configuration for the after-remodel estimate shall include any additions to the building or other changes to the configuration of the conditioned space. For multifamily buildings, the energy consumption shall be based on the entire building including all dwelling units/sleeping units and common areas.

If a building can demonstrate through documentation approved by the Adopting Entity that the remodel activities started prior to project registration, the energy baseline (consumption per square foot before remodel) can be calculated based on data and building systems that were existing in the building up to 3 years prior project registration.

**11.701.1.2 EPA ENERGY STAR Score requirements.** The Multifamily or mixed-use property shall be scored in the EPA ENERGY STAR Portfolio Manager tool following EPA requirements and guidance or equivalent tool or program. This score is based on actual energy usage data. The last month in the 12-month energy data period for this energy score shall be within 6 months prior to acceptance by the Adopting Entity. Where total property energy data is not available, ~~then~~ the score can be generated with 100% actual common area and non-residential area energy usage and not less than 80% of the actual resident energy meters which has been extrapolated to 100%. All energy data and extrapolation methods shall be reported. The level awarded shall comply with Table 305.2.5.



Notwithstanding the above requirements, projects that have an energy score of 65-75 shall achieve Bronze-level certification by implementing energy efficiency measures (EEM) that will improve the energy score to a level above 75. All of the EEMs shall be completed and verified before submission to the Adopting Entity. All energy data, energy modeling, and the forecasted energy score shall be submitted to the Adopting Entity.

**11.701.1.32 Minimum Performance Path requirements.** A building complying with § 11.702 shall include not less than two practices from § 11.706, or not less than one practice from § 11.706 and not less than one practice from § 11.707.

**11.701.1.42 Minimum Prescriptive Path requirements.** A building complying with § 11.703 shall obtain not less than 30 points from § 11.703 and shall include not less than practices from § 11.706, or not less than one practice from § 11.706 and not less than one practice from § 11.707.

**11.701.1.53 ERI Target Path requirements.** A building complying with § 11.704 shall obtain not less than 30 points from § 11.704 and shall include not less than two practices from § 11.706, or not less than one practice from § 11.706 and not less than one practice from § 11.707.

**11.701.1.6 Alternative Silver and Gold Compliance for Tropical Zone requirements.** For buildings in the Tropical Zone, where more than 50 percent of the occupied space is not air conditioned and 100 percent of the occupied space is not heated. The building shall be awarded in accordance with the following:

- (1) § 11.705.1 mandatory practices and § 11.705.2 Additional Tropical Zone practices – Silver 45
  - (2) § 11.705.1 mandatory practices and § 11.705.3 Additional Tropical Zone practices – Gold 60
- [Points awarded shall not be combined with points from § 11.703 (Prescriptive Path) or, § 11.704 (ERI Target Path)]

**~~11.701.1.4 Alternative Bronze level compliance.~~** ~~Buildings that meet one of the following criteria: [Points awarded shall not be combined with points from § 11.703 (Prescriptive Path), § 11.704 (ERI Target Path), or 11.701.1.4 through 11.701.1.8 (Alternative Paths)]~~..... **30**

- ~~(1) — qualifies as an ENERGY STAR National Single Family New Homes Version 3.1 building;~~
- ~~(2) — qualifies as an ENERGY STAR National Multifamily New Construction Version 1.1 building; or~~
- ~~(3) — complies with the IECC.~~

**~~11.701.1.5 Alternative Silver level compliance.~~** ~~Buildings that meet one of the following criteria: [Points awarded shall not be combined with points from § 11.703 (Prescriptive Path), § 11.704 (ERI Target Path), or 11.701.1.4 through 11.701.1.8 (Alternative Paths)]~~..... **45**

- ~~(1) — qualifies as an ENERGY STAR National Single Family New Homes Version 3.2 building; or~~
- ~~(2) — qualifies as an ENERGY STAR National Multifamily New Construction Version 1.2 building;~~
- ~~(3) — complies with the 2024 IECC.~~

**11.701.1.6 Alternative Gold level compliance.** Buildings that meet one of the following criteria: *{Points awarded shall not be combined with points from § 11.703 (Prescriptive Path), § 11.704 (ERI Target Path), or 11.701.1.4 through 11.701.1.8 (Alternative Paths)}*: ..... **60**

- (1) ~~complies with Chapter 7 of the IgCC, additionally, measured compartmentalization shall be no greater than 0.2 CFM50/sf of dwelling unit enclosure area, tested in accordance with ANSI/RESNET/ICC 380, ASTM E779, ASTM E1827, or ASTM E3158;~~
- (2) ~~qualifies as a DOE Zero Energy Ready Homes Single Family;~~
- (3) ~~qualifies as a DOE Zero Energy Ready Homes CA Single Family Version 2;~~
- (4) ~~qualifies as a DOE Zero Energy Ready Multifamily; or~~
- (5) ~~qualifies as a DOE Zero Energy Ready Homes CA Multifamily Version 2.~~

**11.701.1.7 Alternative Emerald level compliance.** Buildings that meet one of the following criteria: *{Points awarded shall not be combined with points from § 703 (Prescriptive Path), § 11.704 (ERI Target Path), or 11.701.1.4 through 11.701.1.8 (Alternative Paths)}*: ..... **70**

- (1) ~~demonstrated to be net zero energy based on modeled site or source energy analysis;~~
- (2) ~~complies with the IECC Appendix CC Zero Energy Commercial Building provisions;~~
- (3) ~~complies with the IECC Appendix RC Zero Energy Residential Building provisions; or~~
- (4) ~~certified to PHIUS CORE or PHIUS ZERO.~~

**11.701.1.8 Alternative Silver or Gold level compliance for Tropical Zones (§ 11.705).** For buildings in the Tropical Zone, where more than 50 percent of the occupied space is not air conditioned and 100 percent of the occupied space is not heated, and comply with one of the following: *{Points awarded shall not be combined with points from § 11.703 (Prescriptive Path) or § 11.704 (ERI Target Path), or 11.701.1.4 through 11.701.1.8 (Alternative Paths)}*

- (1) ~~§ 11.705.1 mandatory practices and § 11.705.2 Additional Tropical Zone practices — Silver ..... 45~~
- (2) ~~IECC Section R401.2.4 (Tropical Zone). Buildings without heating and 50% or less air conditioned space in the Tropical Zone are eligible to earn Silver even if they are located above the IECC elevation limit — Silver ..... 45~~
- (23) ~~§ 11.705.1 mandatory practices and § 11.705.3 Additional Tropical Zone practices — Gold ..... 60~~

**11.701.2 Emerald level points.** The Performance Path (§ 11.702), the ERI Target Path (§ 11.704), or the Alternative Emerald level compliance (§ 11.701.1.7) shall be used to achieve the Emerald level.

**11.701.3 Adopting entity review.** A review by the Adopting Entity or designated third party shall be conducted to verify design and compliance with Chapter 7.

### 11.701.4 Mandatory practices

**11.701.4.0 Minimum energy efficiency requirements.** Additions, alterations, or renovations to an existing building, building system or portion thereof shall comply with the provisions of the IECC as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with the IECC. An addition complies with the IECC **Mandatory**

if the addition complies or if the existing building and addition comply with the IECC as a single building.....

### 11.701.4.1 HVAC systems

**11.701.4.1.1 HVAC system sizing.** Newly installed or modified space heating and cooling system is sized according to heating and cooling loads calculated using ACCA Manual J, or equivalent. New equipment is selected using ACCA Manual S or equivalent. .... **Mandatory**

**11.701.4.1.2 Radiant and hydronic space heating.** Where installed as a primary heat source in the building, new radiant or hydronic space heating system is designed, installed, and documented, using industry-approved guidelines and standards (e.g., ACCA Manual J, AHRI I=B=R, ANSI/ACCA 5 QI, or an accredited design professional’s and manufacturer’s recommendation). .... **Mandatory**

### 11.701.4.2 Duct systems

**11.701.4.2.1 Duct air sealing and testing.** Ducts that are newly installed, modified, or are exposed during the remodel are air sealed and tested. All duct sealing materials are in conformance with UL 181A or UL 181B specifications and are installed in accordance with manufacturer’s instructions. .... **Mandatory**

- (1) All duct sealing materials are in conformance with UL 181A or UL 181B specifications and are installed in accordance with manufacturer’s instructions.
- (2) **Testing.** Dwelling unit total duct leakage testing shall be required for single-family houses and multifamily structures of three stories or fewer above grade. Testing is conducted following procedures in ANSI/RESNET/ICC Std. 380 or ASTM E1554 with a pressure differential of 0.1 in. w.g. (25 Pa) across the entire system and demonstrating compliance with one of the following leakage rates:

**Exception:** Testing is not Mandatory for multifamily structures 4 or more stories in height and in compliance with IECC Section C 403.2.9.

- (a) At rough-in test with air handler installed or at post construction, leakage shall be no greater than 4.0 CFM (113.3 L/min) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of conditioned floor area (CFM/100 cfa) or 40 CFM, whichever is greater; OR
- (b) At rough-in testing without the air handler installed, leakage shall be no greater than 3 CFM/100 cfa (85 L/min/9.29 m<sup>2</sup>) or 30 CFM, whichever is greater; OR
- (c) For ducts entirely within the thermal envelope, leakage shall be no greater than 8 CFM (226.6 L/min) /100 cfa (9.29 m<sup>2</sup>) or 80 CFM, whichever is greater.

**11.701.4.2.2 Ducts and plenums.** Building framing cavities are not used as ducts or plenums. Existing building cavities currently used as supply ducts exposed during the remodel are lined. .... **Mandatory**

**11.701.4.2.3 Duct system sizing.** New or modified duct system is sized and designed in accordance with ACCA Manual D or equivalent..... **Mandatory**

**11.701.4.2.4 Duct insulation.** Supply and return located outside conditioned space shall be insulated to an R-value of not less than R-8 for ducts 3 in. (76 mm) in diameter and larger and not less than R-6 for ducts smaller than 3 in. (76 mm) in diameter. .... **Mandatory**

### 11.701.4.3 Insulation and air sealing

**11.701.4.3.1 Building thermal envelope air sealing.** The building thermal envelope exposed or created during the remodel is durably sealed to limit infiltration. The sealing methods between dissimilar materials allow for differential expansion and contraction. The following are caulked, gasketed, weather-stripped or otherwise sealed with an air barrier material, suitable film or solid material: ..... **Mandatory**

- (a) All joints, seams and penetrations.
- (b) Site-built windows, doors and skylights.
- (c) Openings between window and door assemblies and their respective jambs and framing.
- (d) Utility penetrations.
- (e) Dropped ceilings or chases adjacent to the thermal envelope.
- (f) Knee walls.
- (g) Walls, ceilings, and floors separating conditioned spaces from unconditioned spaces.
- (h) Behind tubs and showers on exterior walls.
- (i) Common walls between dwelling units or sleeping units.
- (j) Attic access openings.
- (k) Joints of framing members at rim joists.
- (l) Top and bottom plates.
- (m) Other sources of infiltration.

**11.701.4.3.2 Air barrier, air sealing, building envelope testing and insulation.** For portions of the building envelope that are exposed or created during the remodel, building envelope air tightness and insulation installation is verified to be in accordance with this Section and § 11.701.4.3.2(1). Insulation installation other than Grade 1 is not permitted. .... **Mandatory**

- (1) **Testing.** Where more than 50% of the building envelope is exposed or created during the remodel, conduct airtightness testing in accordance with procedures in ANSI/RESNET/ICC Std. 380, ASTM E779, ASTM 1827, or ASTM E3158.
- (2) **Gold or Emerald levels.** Demonstrate compliance with one of the following air filtration targets in accordance with § 11.701.4.3.2(1). Projects with more than one dwelling unit are permitted to use a combination of these targets to demonstrate compliance.
  - (a) Measured airtightness shall be no greater than 6 ACH50.
  - (b) Unguarded compartmentalization testing shall be no greater than 0.40 CFM50 per square foot of dwelling unit enclosure area.
  - (c) Twenty percent improvement of ACH50 or CFM50 per square foot compared to pre-remodeling tested conditions.

Testing shall be conducted after rough-in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation, and combustion appliances. Testing is conducted under the following conditions:

- (a) exterior windows and doors, fireplace and stove doors are closed, but not sealed;

- (b) dampers are closed, but not sealed, including exhaust, intake, make-up air, backdraft and flue dampers;
- (c) interior doors are open;
- (d) exterior openings for continuous ventilation systems and heat recovery ventilators are closed and sealed;
- (e) heating and cooling systems are turned off;
- (f) HVAC duct terminations are not sealed; and
- (g) supply and return registers are not sealed.

**Multifamily Building Note:** *Testing by dwelling units, sleeping units, groups of dwelling units, groups of sleeping units, or the building as a whole is acceptable.*

- (3) **Visual inspection.** The air barrier and insulation items listed in Table 11.701.4.3.2(2) are field verified by visual inspection.

**Table 11.701.4.3.2(2)**  
**Air Barrier, Air Sealing and Insulation Installation<sup>a</sup>**

COMPONENT	AIR BARRIER CRITERIA	INSULATION INSTALLATION CRITERIA
General requirements	A continuous air barrier shall be installed in the building thermal envelope. Breaks or joints in the air barrier shall be sealed. Air-permeable insulation shall not be used as a sealing material.	Air-permeable insulation shall not be used as a sealing material.
Ceiling/attic	The air barrier in any dropped ceiling or soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed. Access openings, drop down stairs or knee wall doors to unconditioned attic spaces shall be sealed.	The insulation in any dropped ceiling/soffit shall be aligned with the air barrier.
Walls	The junction of the foundation and sill plate shall be sealed. The junction of the top plate and the top of exterior walls shall be sealed. Knee walls shall be sealed.	Cavities within comers and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance, <i>R</i> -value, of not less than R-3 per inch. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.
Windows, skylights and doors	The space between framing and skylights, and the jambs of windows and doors shall be sealed.	
Rim joists	Rim joists shall include an exterior air barrier. <sup>b</sup> The junctions of the rim board to the sill plate and the rim board and the subfloor shall be air sealed.	Rim joists shall be insulated so that the insulation maintains permanent contact with the exterior rim board. <sup>b</sup>
Floors including cantilevered floors and floors above garages	The air barrier shall be installed at any exposed edge of insulation.	Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of subfloor decking. Alternatively, floor framing cavity insulation shall be in contact with the top side of sheathing, or continuous insulation installed on the underside of floor framing and extending from the bottom to the top of all perimeter floor framing members.
Basement crawl space and slab foundations	Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder/air barrier in accordance with Section R402.2.10. Penetrations through concrete foundation walls and slabs shall be air sealed. Class 1 vapor retarders shall not be used as an air barrier on below-grade walls and shall be installed in accordance with Section R702.7 of the <i>International Residential Code</i> .	Crawl space insulation, where provided instead of floor insulation, shall be installed in accordance with Section R402.2.10. Conditioned basement foundation wall insulation shall be installed in accordance with Section R402.2.8.1. Slab-on-grade floor insulation shall be installed in accordance with Section R402.2.10.
Shafts, penetrations	Duct and flue shafts and other similar penetrations exterior or unconditioned space shall be sealed to allow for expansion, contraction and mechanical vibration. Utility penetrations of the air barrier shall be caulked, gasketed or otherwise sealed and shall allow for expansion, contraction of materials and mechanical vibration.	Insulation shall be fitted tightly around utilities passing through shafts and penetrations in the building thermal envelope to maintain required <i>R</i> -value.
Narrow cavities	Narrow cavities of 1 inch or less that are not able to be insulated shall be air sealed.	Batts to be installed in narrow cavities shall be cut to fit or narrow cavities shall be filled with insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.	Insulated portions of the garage separation assembly shall be installed in accordance with Sections R303 and R402.2.7.
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be air sealed in accordance with Section R402.4.5.	Recessed light fixtures installed in the building thermal envelope shall be airtight and IC rated, and shall be buried or surrounded with insulation.

OPERATION, MAINTENANCE, AND BUILDING OWNER EDUCATION

Plumbing wiring or other obstructions	All holes created by wiring, plumbing or other obstructions in the air barrier assembly shall be air sealed.	Insulation shall be installed to fill the available space and surround wiring, plumbing, or other obstructions, unless the required R-value can be met by installing insulation and air barrier systems completely to the exterior side of the obstructions.
Shower/tub on exterior wall	The air barrier shall be installed at exterior walls adjacent to showers and tubs shall separate the wall from the shower or tub.	Exterior walls adjacent to showers and tubs shall be insulated.
Electrical/phone box on exterior walls	The air barrier shall be installed behind electrical and communication boxes. Alternatively, air-sealed boxes shall be installed.	
HVAC register boots	HVAC and supply and return register boots that penetrate building thermal envelope shall be sealed to the subfloor, wall covering or ceiling penetrated by the boot.	
Concealed sprinklers	When required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.	

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

b. Insulation fully enclosed by an air barrier is not required in unconditioned/ventilated attic spaces and at rim joists.

**11.701.4.3.2.1 Grade I insulation installation.** Field-installed insulation products to ceilings, walls, floors, band joists, rim joists, conditioned attics, basements, and crawlspaces, except as specifically noted, are verified by a third-party as Grade I in accordance with the following: ..... **Mandatory**

- (1) Inspection is conducted before insulation is covered.
- (2) Air-permeable insulation is enclosed on all six sides and is in substantial contact with the sheathing material on one or more sides (interior or exterior) of the cavity. Air permeable insulation in ceilings is not required to be enclosed when the insulation is installed in substantial contact with the surfaces it is intended to insulate.
- (3) Cavity insulation uniformly fills each cavity side-to-side and top-to-bottom, without substantial gaps or voids around obstructions (such as blocking or bridging).
- (4) Cavity insulation compression or incomplete fill amounts to 2% or less, presuming the compressed or incomplete areas are not less than 70% of the intended fill thickness; occasional small gaps are acceptable.
- (5) Exterior rigid insulation has substantial contact with the structural framing members or sheathing materials and is tightly fitted at joints.
- (6) Cavity insulation is split, installed, and/or fitted tightly around wiring and other services.
- (7) Exterior sheathing is not visible from the interior through gaps in the cavity insulation.
- (8) Faced batt insulation is permitted to have side-stapled tabs, provided the tabs are stapled neatly with no buckling, and provided the batt is compressed only at the edges of each cavity, to the depth of the tab itself.
- (9) Where properly installed, ICFs, SIPs, and other wall systems that provide integral insulation are deemed in compliance with this section.
- (10) Thin film products, including but not limited to radiant barrier film, that are designed to be installed with an air spaced to achieve their designated R-value shall be installed in accordance with manufacturer's instructions.

**11.701.4.3.3 Fenestration air leakage.** Newly installed Windows, skylights and sliding glass doors have an air infiltration rate of no more than 0.3 cfm per ft<sup>2</sup> (1.5 L/s/m<sup>2</sup>), and swinging doors no more than 0.5 cfm per ft<sup>2</sup> (2.6 L/s/m<sup>2</sup>), when tested in accordance with NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and listed and labeled. For site-built fenestration, a test report by an accredited, independent laboratory verifying compliance with the applicable infiltration rate shall be submitted to demonstrate compliance with this practice. This practice does not apply to field-fabricated fenestration products. .... **Mandatory**

**Exception:** For Tropical Zones only, jalousie windows are permitted to be used as a conditioned space boundary and shall have an air infiltration rate of not more than 1.3 cfm per ft<sup>2</sup>

**11.701.4.3.4 Lighting and building thermal envelope.** Newly installed luminaires installed in the building thermal envelope which penetrate the air barrier are sealed to limit air leakage between conditioned and unconditioned spaces. All luminaires are IC-rated and labeled as complying with ASTM E283 when tested at 1.57 psf (75 Pa) pressure differential with no more than 2.0 cfm (0.944 L/s) of air movement from the conditioned space to the ceiling cavity. All luminaires installed in the building thermal envelope which penetrate the air barrier are sealed with a gasket or caulk between the housing and the interior of the wall or ceiling covering. .... **Mandatory**

**11.701.4.4 High-efficacy lighting.** Lighting efficacy in dwelling units or sleeping units is in accordance with one of the following: ..... **Mandatory**

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



(2) Lighting power density, measured in watts/square foot, shall be 0.45 or less.

**11.701.4.5 Boiler piping.** Boiler piping in unconditioned space supplying and returning heated water or steam that is accessible during the remodel is insulated. Exception: where condensing boilers are installed, insulation is not required for return piping ..... **Mandatory**

**11.701.4.6 Fenestration specifications.** The NFRC-certified U-factor and SHGC of newly installed windows, exterior doors, skylights, and tubular daylighting devices (TDDs) do not exceed the values in Table 11.703.2.5.1. .... **Mandatory**

**11.701.4.7 Replacement fenestration.** Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the NFRC-certified U-factor and SHGC of the replacement fenestration unit do not exceed the values in Table 11.703.2.5.1. .... **Mandatory**

**11.702 PERFORMANCE PATH**

**STAFF NOTE:** Language from A009 and A010, that was Accepted As Modified by the Consensus Committee at their November 8-10, 2022 meeting, was not fully incorporated into the first draft standard but is included in this draft standard.

**11.702.1 Point allocation.** Points from § 11.702 (Performance Path) shall not be combined with points from § 11.703 (Prescriptive Path), § 11.704 (ERI Target Path), or § 11.701.1.4 through § 11.701.1.8 (Alternative Paths). .... **Mandatory for § 702**

**11.702.2 Energy performance levels**

**11.702.2.1 IECC equivalency analysis.** Energy efficiency features are implemented to achieve energy cost, or site energy, source energy, or carbon dioxide equivalent emissions (CO<sub>2</sub>e) performance that complies with the IECC thresholds (or equivalents thereof). When using equivalents to code thresholds, employ the methodology in ANSI/ASHRAE Standard 105-2021 or the IgCC. .... **Mandatory for § 702**

**11.702.2.2 Minimum energy performance analysis.** Energy efficiency features are implemented to achieve energy cost, or site energy, or source energy, or CO<sub>2</sub>e performance that complies with the applicable minimum energy performance threshold in § 11.702.2.2.1 or § 11.702.2.2.2. .... **Mandatory for § 702**

**11.702.2.2.1 Residential buildings.** A documented analysis that either demonstrates compliance with IECC using software in accordance with IECC Section R405 applied as defined in the IECC, or that demonstrates performance at least as good as the NGBS Reference Home values in Table 11.702.2.2.1 using software approved by and applied as defined by the Adopting Entity, is required.

**11.702.2.2.2 Commercial buildings.** A documented analysis that demonstrates compliance with the IECC using software in accordance with IECC Section C407 or ASHRAE 90.1 Appendix G or Energy Cost Budget simulation general requirements, is required.

**Table 11.702.2.2.1**  
**NGBS Reference Home Values**  
**(Single-Family & Low-Rise Multifamily Modeling)**

CATEGORY	REFERENCE
<b>Building Envelope</b>	<b>NGBS</b>
Slab	IECC Table R402.1.3
Floor	IECC Table R405.4.2(1)
Ceiling	IECC Table R405.4.2(1)
Door	IECC Table R405.4.2(1)
Insulation Rim/Band	IECC Table R405.4.2(1)
Insulation Walls	IECC Table R405.4.2(1)
Windows	IECC Table R405.4.2(1)
<b>Air Infiltration</b>	IECC Table R405.4.2(1)
<b>Heating System Efficiency</b>	10 CFR 430.32 (e) Furnaces and boilers
<b>Cooling System Efficiency</b>	10 CFR 430.32(c) Central air conditioners and heat pumps
<b>Ventilation System Efficiency</b>	
Energy Use of Ventilation Equipment	IECC Table R405.4.2(1)
<b>Duct Sealing</b>	
Duct Air Leakage Testing	IECC Table R405.4.2(1)
<b>Water Heating System Efficiencies</b>	10 CFR 430.32(d) Water heaters
<b>Lighting</b>	Default lighting and appliance values from ANSI/RESNET 301
<b>Appliances</b>	Default lighting and appliance values from ANSI/RESNET 301

**11.702.2.3 Energy performance analysis.** Energy savings levels above the IECC are determined through an analysis that includes improvements in building envelope, air infiltration, heating system efficiencies, cooling system efficiencies, duct sealing, water heating system efficiencies, lighting, appliances, and on-site renewable energy. Points are assigned using the following formula:

$$\text{Points} = 30 + (\text{percent above threshold identified in § 11.702.2.1.1. or § 11.702.2.1.2}) * 2$$

**Multifamily Building Note:** Modeling is completed building-wide using one of the following methods: whole building energy modeling, a unit-by-unit approach, or a building average of a unit-by-unit approach.

**11.702.2.4 Tropical standard reference design.** For the Tropical Climate Zone, the standard reference design shall use the specifications in IECC Section R401.2.4 (Tropical Zone).

**11.703 PRESCRIPTIVE PATH**

**11.703.1 Mandatory practices** ..... **30**

In accordance with § 305.2.3, mandatory practices are not required where not applicable. Where § 11.703.1 practices are out of scope of work, 30 points shall be achieved elsewhere from § 11.703.

**11.703.1.1 Building thermal envelope compliance.** For conditioned spaces, the building thermal envelope is in compliance with § 11.703.1.1.1 or § 11.703.1.1.2. .... **Mandatory for § 11.703**



	POINTS							
0 to <5%	0	0	0	0	0	0	0	0
5% to <10%	2	3	3	3	3	3	3	3
10% to <15%	3	6	5	6	6	6	5	7
15% to <20%	5	9	8	9	9	9	8	10
20% to <25%	6	12	10	12	12	12	11	13
25% to <30%	8	15	13	16	14	15	14	17
30% to <35%	10	18	16	19	17	18	16	20
≥35%	11	21	18	22	20	21	19	23

a. Tropical Climate Zone: Points are Climate Zone 1 points divided by 2 and rounded down

Exception: For the Tropical Climate Zone, crawl space, basement, and floor u-factors are excluded from the total building thermal envelope UA improvement calculation.

**11.703.2.2 Mass walls.** More than 75% of the above-grade exterior opaque wall area of the building is mass walls.

Per Table  
11.703.2.2

**Table 11.703.2.2  
Exterior Mass Walls**

Mass thickness	Climate Zone			
	1-4	5	6	7-8
	<b>POINTS</b>			
≥3 in. to <6 in.	1	0	0	0
>6 in.	3	2	2	0

**11.703.2.3** A radiant barrier with an emittance of 0.05 or less is used in the attic. The product is tested in accordance with ASTM C1371 and installed in accordance with the manufacturer’s instructions.

Per Table  
11.703.2.3

**Table 11.703.2.3  
Radiant Barriers**

Climate Zone	POINTS
Tropical	3
1	2
2-3	3
4-5	1
6-8	0

*[In climate zones 1-3, 1 point maximum for multifamily buildings four or more stories in height.]*

**11.703.2.4 Building envelope leakage.** The maximum building envelope leakage rate is in accordance with Table 11.703.2.4(a) or Table 11.703.2.4(b) and whole building ventilation is provided in accordance with § 11.902.2.1.

Per Table  
11.703.2.4(a)  
or  
11.703.2.4(b)

**Table 11.703.2.4(a)  
Building Envelope Leakage**

Max Envelope Leakage Rate (ACH50)	Climate Zone							
	1	2	3	4	5	6	7	8
	<b>POINTS</b>							
4	1	2	-	-	-	-	-	-

3	2	4	-	-	-	-	-	-
2	3	5	3	4	4	6	8	7
1	4	7	5	7	7	10	15	11

**Table 11.703.2.4(b)**  
**Building Envelope Leakage**

Max Envelope Leakage Rate (ELR50)	Climate Zone							
	1	2	3	4	5	6	7	8
	POINTS							
0.28	1	2	-	-	-	-	-	-
0.23	2	4	-	-	-	-	-	-
0.18	3	5	3	4	4	6	8	7
0.13	4	7	5	7	7	10	15	11

Where ELR50 = CFM50 / Building Thermal Envelope Area  
CFM50 = cubic feet per minute at 50 Pa

[Points not awarded if points are taken under § 11.705.6.2.1.

**11.703.2.5 Fenestration**

**11.703.2.5.1** NFRC-certified (or equivalent) U-factor and SHGC of windows, exterior doors, skylights, and tubular daylighting devices (TDDs) on an area-weighted average basis do not exceed the values in IECC Table R402.1.2 or Table C402.4, as applicable. Area weighted averages are calculated separately for the categories of 1) windows and exterior doors and 2) skylights and tubular daylighting devices (TDDs). Decorative fenestration elements with a combined total area not greater than 15 ft<sup>2</sup> (1.39 m<sup>2</sup>) or 10% of the total glazing area, whichever is less, are not required to comply with this practice. Unconditioned buildings 3 stories or less in height located in the Tropical Zone are exempt from this practice if the building has a roof SRI of not less than 0.85, and a wall reflectivity of not less than 0.39.....

**Mandatory for § 11.703**

**11.703.2.5.1.1 Dynamic glazing.** Dynamic glazing is permitted to satisfy the SHGC requirements of Table 11.703.2.5.1 provided the ratio of the higher to lower labeled SHGC is greater than or equal to 2.4 and the dynamic glazing is automatically controlled to modulate the amount of solar gain into the space in multiple steps. Fenestration with dynamic glazing is considered separately from other fenestration and area-weighted averaging with fenestration that does not use dynamic glazing is not permitted. Dynamic glazing is not required to be automatically controlled or comply with minimum SHGC ratio when both the lower and higher labeled SHGC already comply with the requirements of Table 11.703.2.5.1.

**11.703.2.5.2** The NFRC-certified (or equivalent) U-factor and SHGC of windows, exterior doors, skylights, and tubular daylighting devices (TDDs) are in accordance with Table 11.703.2.5.2(a), (b), or (c). Decorative fenestration elements with a combined total area not greater than 15 ft<sup>2</sup> (1.39 m<sup>2</sup>) or 10% of the total glazing area, whichever is less, are not required to comply with this practice.

**Per Table 11.703.2.5.2(a), or 11.703.2.5.2 (b), or 11.703.2.5.2 (c)**

**Table 11.703.2.5.2(a)**  
**Enhanced Fenestration Specifications**

Climate Zones	U-Factor Windows & Exterior Doors	SHGC Windows & Exterior Doors	U-Factor Skylights & TDDs	SHGC Skylights & TDDs	POINTS
1	0.40	0.25	0.60	0.28	1
2	0.40	0.25	0.60	0.28	1
3	0.27	0.25	0.50	0.28	2
4	0.27	0.40	0.50	0.35	3

5	0.27	Any	0.50	Any	<b>3</b>
6	0.27	Any	0.50	Any	<b>4</b>
7	0.27	Any	0.50	Any	<b>4</b>
8	0.27	Any	0.50	Any	<b>4</b>

Exception: For Sun-tempered designs complying with the requirements of § 11.703.7.1, the SHGC is permitted to be 0.40 or higher on south facing glass.

**Table 11.703.2.5.2(b)  
Enhanced Fenestration Specifications**

Climate Zone	U-Factor Windows & Exterior Doors	SHGC Windows & Exterior Doors	U-Factor Skylights & TDDs	SHGC Skylights & TDDs	<b>POINTS</b>
1	0.38	0.25	0.55	0.28	<b>2</b>
2	0.38	0.25	0.53	0.28	<b>3</b>
3	0.30	0.25	0.50	0.28	<b>4</b>
4	0.28	0.40	0.50	0.35	<b>4</b>
5	0.25	Any	0.48	Any	<b>4</b>
6	0.25	Any	0.48	Any	<b>5</b>
7	0.25	Any	0.46	Any	<b>5</b>
8	0.25	Any	0.46	Any	<b>4</b>

Exception: For Sun-tempered designs complying with the requirements of § 11.703.7.1, the SHGC is permitted to be 0.40 or higher on south facing glass.

**Table 11.703.2.5.2(c)  
Enhanced Fenestration Specifications**

Climate Zones	U-Factor Windows & Exterior Doors	SHGC Windows & Exterior Doors	U-Factor Skylights & TDDs	SHGC Skylights & TDDs	<b>POINTS</b>
4	0.25	0.40	0.45	0.40	<b>6</b>
5-8	0.22	Any	0.42	Any	<b>6</b>

*[Points for multifamily buildings four or more stories in height are awarded at 3 times the point value listed in Table 11.703.2.5.2(c)]*

**11.703.2.5.2.1 Dynamic glazing.** Dynamic glazing is permitted to satisfy the SHGC requirements of Tables 11.703.2.5.2(a), 11.703.2.5.2(b), and 11.703.2.5.2(c) provided the ratio of the higher to lower labeled SHGC is greater than or equal to 2.4, and the dynamic glazing is automatically controlled to modulate the amount of solar gain into the space in multiple steps. Fenestration with dynamic glazing is considered separately from other fenestration, and area-weighted averaging with fenestration that does not use dynamic glazing is not permitted. Dynamic glazing is not required to be automatically controlled or comply with minimum SHGC ratio when both the lower and higher labeled SHGC already comply with the requirements of Tables 11.703.2.5.2(a), 11.703.2.5.2(b), and 11.703.2.5.2(c).

### 11.703.3 HVAC equipment efficiency

**11.703.3.0 Multiple heating and cooling systems.** For multiple heating or cooling systems in one home, practices § 11.703.3.1 through § 11.703.3.6 apply to the system that supplies 80% or more of the total installed heating or cooling capacity. Where multiple systems each serve less than 80% of the total installed heating or cooling capacity, points under § 11.703.3.1 through § 11.703.3.6 are awarded either for the system eligible for the fewest points or the weighted average of the systems. The weighted average shall be calculated in accordance with the following equation and be based

upon the efficiency and capacity of the equipment as selected in accordance with ACCA Manual S with it loads calculated in accordance with ACCA Manual J.

$$\text{Weighted Average} = [(E_{\text{unit } 1} * C_{\text{unit } 1}) + (E_{\text{unit } 2} * C_{\text{unit } 2}) + \dots + (E_{\text{unit } n} * C_{\text{unit } n})] / (C_{\text{unit } 1} + C_{\text{unit } 2} + \dots + C_{\text{unit } n})$$

where:

E = Rated AHRI efficiency for unit

C = Rated heating or cooling capacity for unit

n = Unit count

**11.703.3.1** Combination space heating and water heating system (combo system) is installed using either a coil from the water heater connected to an air handler to provide heat for the building, dwelling unit or sleeping unit, or a space heating boiler using an indirect-fired water heater.

- (a) Devices have a combined annual efficiency of not less than 0.80 and a water heating recovery efficiency of not less than 0.87. .... **4**
- (b) Devices have a combined annual efficiency of not less than 0.94 and a water heating recovery efficiency of not less than 0.95 ..... **6**
- (c) Devices have a combined annual efficiency of not less than 1.15 and a water heating recovery efficiency of not less than 1.20. .... **10**
- (d) Devices have a combined annual efficiency of not less than 1.15 and a water heating recovery efficiency of not less than 1.20 and serves a third building load (e.g., pool heating). **12**

Items (b)-(d) are not available if points are awarded in 11.703.3.3 through 11.703.3.6 or 11.703.5.

**11.703.3.2** Furnace and/or boiler efficiency is in accordance with one of the following:

- (1) Gas and propane heaters:

Per Table  
11.703.3.2(1)(a)  
or  
11.703.3.2(1)(b)

**Table 11.703.3.2(1)(a)**  
**Gas and Propane Heating Systems**

AFUE / COP	Climate Zone							
	1	2	3	4	5	6	7	8
	<b>POINTS</b>							
≥90% AFUE	0	2	3	6	6	9	10	12
≥92% AFUE	0	2	4	7	8	10	12	14
≥94% AFUE	0	3	4	9	9	12	14	16
≥96% AFUE	1	3	5	10	10	14	16	19
≥98% AFUE	1	3	6	11	12	16	18	21
≥1.2 COP <sup>a</sup>	1	4	9	16	18	23	26	30
≥1.4 COP <sup>a</sup>	1	5	11	19	21	26	30	35

a. This requirement is used for gas-fired heat pump systems.

**Table 11.703.3.2(1)(b)**  
**Gas and Propane Heating Systems for Multifamily Buildings Four or More Stories in Height**

AFUE / COP	Climate Zone							
	1	2	3	4	5	6	7	8
	<b>POINTS</b>							
≥90% AFUE	0	4	4	8	8	10	11	13
≥92% AFUE	0	4	4	9	10	11	12	14
≥94% AFUE	0	5	5	10	11	12	14	16
≥96% AFUE	0	5	5	12	12	13	15	17

≥98% AFUE	0	6	6	13	13	14	16	18
≥1.2 COP <sup>a</sup>	0	8	8	18	18	18	21	23
≥1.4 COP <sup>a</sup>	0	9	9	21	21	21	24	26

a. This requirement is used for gas-fired heat pump systems.

(2) Oil furnace:

Per Table  
11.703.3.2(2)

**Table 11.703.3.2(2)**  
**Oil Furnace**

AFUE	Climate Zone							
	1	2	3	4	5	6	7	8
	<b>POINTS</b>							
≥85% AFUE	0	1	2	3	3	4	5	6
≥90% AFUE	0	2	3	6	6	9	10	12

(3) Gas boiler:

Per Table  
11.703.3.2(3)

**Table 11.703.3.2(3)**  
**Gas Boiler**

AFUE	Climate Zone							
	1	2	3	4	5	6	7	8
	<b>POINTS</b>							
≥85% AFUE	0	1	1	2	3	4	4	4
≥90% AFUE	0	1	2	4	6	7	8	6
≥94% AFUE	0	2	3	5	8	9	10	8
≥96% AFUE	0	2	4	6	9	11	12	10

(4) Oil boiler:

Per Table  
11.703.3.2(4)

**Table 11.703.3.2(4)**  
**Oil Boiler**

AFUE	Climate Zone							
	1	2	3	4	5	6	7	8
	<b>POINTS</b>							
≥90% AFUE	0	2	3	5	6	7	9	10
≥95% AFUE	0	2	3	6	6	9	10	12

**11.703.3.3** Heat pump heating efficiency is in accordance with Table 11.703.3.3(1) or Table 11.703.3.3(2) or Table 11.703.3.3(3). Refrigerant charge is verified for compliance with manufacturer’s instructions utilizing a method in ACCA 5 QI Section 4.3.

Per Table  
11.703.3.3(1)  
or  
11.703.3.3(2)  
or  
11.703.3.3(3)

**Table 11.703.3.3(1)**  
**Electric Heat Pump Heating**

Efficiency	Climate Zone					
	1	2	3	4	5	6-8 <sup>a</sup>
	<b>POINTS</b>					
≥8.5 HSPF2 (11.5 EER2)	0	1	1	2	2	2
≥9.0 HSP2F (12.5 EER2)	0	2	4	5	6	10
≥9.5 HSPF2	0	3	7	7	11	18
≥10.0 HSPF2	1	5	10	10	15	26
≥12.0 HSPF2	1	6	11	11	17	28



**Table 11.703.3.3(2)**  
**Electric Heat Pump Heating for Multifamily Buildings Four or More Stories in Height**

Efficiency	Climate Zone					
	1	2	3	4	5	6-8 <sup>a</sup>
	<b>POINTS</b>					
≥8.5 HSPF2 (11.5 EER2)	0	3	4	8	11	13

**Table 11.703.3.3(3)**  
**Gas Engine-Driven Heat Pump Heating**

Efficiency	Climate Zone					
	1	2	3	4	5	6-8
	<b>POINTS</b>					
≥1.3 COP at 47°F	2	7	11	14	16	18

**11.703.3.4** Cooling efficiency is in accordance with Table 11.703.3.4(1) or Table 11.703.3.4(2). Refrigerant charge is verified for compliance with manufacturer’s instructions utilizing a method in ACCA 5 QI Section 4.3.

**Per Table 11.703.3.4(1) or 11.703.3.4(2)**

**Table 11.703.3.4(1)**  
**Electric Air Conditioner and Heat Pump Cooling<sup>a</sup>**

Efficiency	Climate Zone							
	1	2	3	4	5	6	7	8
	<b>POINTS</b>							
≥15 SEER2 (12.5 EER2)	6	4	2	1	1	1	1	0
≥17 SEER2 (12.5 EER2)	11	9	7	3	3	2	2	0
≥19 SEER2 (12.5 EER2)	19	12	10	6	4	4	4	0
≥21 SEER2	26	15	14	8	6	6	5	0
≥25 SEER2	29	18	17	10	8	8	6	0

a. Tropical Climate Zone: where none of the occupied space is air conditioned and where ceiling fans are provided for bedrooms and the largest space which is not used as a bedroom, 20 points is awarded.

**Table 11.703.3.4(2)**  
**Gas Engine-Driven Heat Pump Cooling**

Efficiency	Climate Zone					
	1	2	3	4	5	6-8
	<b>POINTS</b>					
>1.2 COP at 95°F	3	6	3	1	1	0

**11.703.3.5** Water source cooling and heating efficiency is in accordance with Table 11.703.3.5. Refrigerant charge is verified for compliance with manufacturer’s instructions utilizing a method in ACCA 5 QI Section 4.3.

**Per Table 11.703.3.5**

**Table 11.703.3.5**  
**Water Source Cooling and Heating**

Efficiency	Climate Zone					
	1	2	3	4	5	6-8
	<b>POINTS</b>					
≥15 EER2, ≥4.0 COP	14	18	22	30	37	37

**11.703.3.6** Ground source heat pump is installed by a Certified Geothermal Service Contractor in accordance with Table 11.703.3.6. Refrigerant charge is verified for compliance with manufacturer’s instructions utilizing a method in ACCA 5 QI Section 4.3.

**Per Table 11.703.3.6**

**Table 11.703.3.6  
Ground Source Heat Pump<sup>a</sup>**

Efficiency	Climate Zone				
	1	2	3	4	5-8
	<b>POINTS</b>				
≥16.0 EER2, ≥3.6 COP	<b>1</b>	<b>1</b>	<b>2</b>	<b>16</b>	<b>22</b>
≥24.0 EER2, ≥4.3 COP	<b>24</b>	<b>29</b>	<b>22</b>	<b>31</b>	<b>35</b>
≥28.0 EER2, ≥4.8 COP	<b>42</b>	<b>46</b>	<b>35</b>	<b>42</b>	<b>44</b>

a. The ground loop is sized to account for the ground conductance and the expected minimum incoming water temperature to achieve rated performance.

**11.703.3.7** ENERGY STAR, or equivalent, ceiling fans are installed. *[Points awarded per building.]* ..... **1**

*[For Tropical Climate Zone and Climate Zones 2B, 3B, and 4B: points awarded per fan where AC is not installed in the dwelling unit or sleeping unit (Max 8 points), and where points awarded in § 11.703.3.8 for these specific climate zones, points shall not be awarded in § 11.703.3.7.]*

**11.703.3.8** Whole-building or whole-dwelling unit or whole-sleeping unit fan(s) with insulated louvers and a sealed enclosure is installed. *[Points awarded per building.]* **Per Table 11.703.3.8**

**Table 11.703.3.8  
Whole Dwelling Unit Fan**

Climate Zone		
1-3, Tropical	4-6	7-8
<b>POINTS</b>		
<b>4</b>	<b>3</b>	<b>0</b>

## 11.703.4 Duct systems

**11.703.4.1** All space heating is provided by a system(s) that does not include air ducts. **Per Table 11.703.4.1**

**Table 11.703.4.1  
Ductless Heating System**

Climate Zone					
1	2	3	4	5	6-8
<b>POINTS</b>					
<b>0</b>	<b>2</b>	<b>4</b>	<b>6</b>	<b>8</b>	<b>8</b>

**11.703.4.2** All space cooling is provided by a system(s) that does not include air ducts. **Per Table 11.703.4.2**

**Table 11.703.4.2  
Ductless Cooling System**

Climate Zone					
1	2	3	4	5	6-8
<b>POINTS</b>					
<b>8</b>	<b>8</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>0</b>

**11.703.4.3** Ductwork is in accordance with all of the following: **Per Table 11.703.4.3**

- (1) Building cavities are not used as return ductwork.
- (2) Heating and cooling ducts and mechanical equipment are installed within the conditioned building space.
- (3) Ductwork is not installed in exterior walls.

**Table 11.703.4.3  
Ducts**

Climate Zone					
1	2	3	4	5	6-8
<b>POINTS</b>					
<b>8</b>	<b>10</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>4</b>

**11.703.4.4 Duct Leakage.** The entire central HVAC duct system, including air handlers and register boots, is tested by a third party for total leakage at a pressure differential of 0.1 in. w.g. (25 Pa) and maximum air leakage is equal to or less than 6% of the system design flow rate or 4 cu-ft per minute per 100 ft<sup>2</sup> of conditioned floor area.

**Per Table  
11.703.4.4**

**Table 11.703.4.4  
Duct Leakage**

Ductwork location	Climate Zone					
	1	2	3	4	5	6-8
<b>POINTS</b>						
ductwork <i>entirely outside</i> the building's thermal envelope	<b>4</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
ductwork <i>entirely inside</i> the building's thermal envelope	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
ductwork <i>inside and outside</i> the building's thermal envelope	<b>3</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1</b>

*Points not awarded if points are taken under § 11.706.6.2.3.*

## 11.703.5 Water heating system

**11.703.5.1** Water heater Uniform Energy Factor (UEF) is in accordance with the following:

*[Where multiple systems are used, points awarded based on the system with the lowest efficiency.]*

*Water heater design is based on only 1 (one) water heater per dwelling unit, based on approved methods from IPC, ASPE, or manufacturer specifications. All table values are based on water heaters with medium water draws as defined by the DOE test procedures (55 gallons per day).*

(1) Gas water heating

**Per Table  
11.703.5.1(1)(a)  
through  
11.703.5.1(1)(e)**

**Table 11.703.5.1(1)(a)  
Gas Water Heating  
Storage Water Heater, Rated Storage Volume > 20 Gallons and ≤ 55 Gallons,  
Medium Water Draw**

Uniform Energy Factor	Climate Zone							
	1	2	3	4	5	6	7	8
<b>POINTS</b>								
0.65 to <0.78	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>
≥0.78	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>

**Table 11.703.5.1(1)(b)  
Gas Water Heating  
Storage Water Heater, Rated Storage Volume > 55 Gallons and ≤ 100 Gallons,  
Medium Water Draw**

Uniform Energy Factor	Climate Zone							
	1	2	3	4	5	6	7	8

	POINTS							
≥0.78	1	1	1	1	1	1	1	1

**Table 11.703.5.1(1)(c)**  
**Gas Water Heating**  
**Storage Water Heater with Input Rate Greater than 75,000 Btu/h**  
**(Commercial)**

Thermal Efficiency	Climate Zone							
	1	2	3	4	5	6	7	8
	POINTS							
0.90 to < 0.95	6	6	5	3	3	3	3	2
≥0.95	7	7	5	4	4	4	4	2

**Table 11.703.5.1(1)(d)**  
**Gas Water Heating**  
**Storage Water Heater with Input Rate Greater than 75,000 Btu/h**  
**(Commercial),**  
**In Buildings with High-Capacity Service Water-Heating Systems**  
**(1,000,000 Btu/h or Greater)**

Thermal Efficiency	Climate Zone							
	1	2	3	4	5	6	7	8
	POINTS							
0.92 to < 0.95	1	1	1	1	1	1	1	1
≥0.95	2	2	2	2	2	2	2	1

**Table 11.703.5.1(1)(e)**  
**Gas Water Heating**  
**Instantaneous Water Heater, Rated Storage Volume < 2 Gallons**  
**and Input Rate of > 50,000 Btu/h, Medium Water Draw**

Uniform Energy Factor	Climate Zone							
	1	2	3	4	5	6	7	8
	POINTS							
0.89 to < 0.94	2	2	2	1	1	1	1	1
≥0.94	3	3	2	2	2	2	2	1

(2) Electric water heating

**Table 11.703.5.1(2)(a)**  
**Storage Water Heater, Rated Storage Volume ≥ 20 Gallons and ≤ 55 Gallons,**  
**Medium Water Draw**

Uniform Energy Factor	Climate Zone							
	1	2	3	4	5	6	7	8
	POINTS							
0.94 to <1.0	1	1	1	1	1	1	1	1
1.0 to <1.5	4	2	2	2	1	1	1	1
1.5 to <2.0	7	4	3	2	2	2	1	1
2.0 to <2.2	14	8	7	5	4	4	2	2
2.2 to <2.5	17	9	8	6	5	4	3	3
2.5 to <3.0	18	12	10	8	6	6	3	3
≥3.0	22	16	13	11	8	8	4	3

Per Table  
 11.703.5.1(2)(a)  
 ) through  
 11.703.5.1(2)(e)  
 )

**Table 11.703.5.1(2)(b)**  
**Storage Water Heater, Rated Storage Volume  $\geq$  55 Gallons and  $\leq$  120 Gallons,**  
**Medium Water Draw**

Uniform Energy Factor	Climate Zone							
	1	2	3	4	5	6	7	8
	<b>POINTS</b>							
2.2 to <2.5	6	4	3	3	2	2	1	1
2.5 to <3.0	7	5	4	3	3	3	2	2
3.0 to <3.5	8	5	5	4	3	3	3	2
$\geq$ 3.5	9	6	6	5	4	4	3	2

**Table 11.703.5.1(2)(c)**  
**Storage Water Heater, Rated Storage Volume > 120 Gallons,**  
**Medium Water Draw**

Coefficient of Performance	Climate Zone							
	1	2	3	4	5	6	7	8
	<b>POINTS</b>							
2.5 to <3.0	14	8	7	5	4	4	2	2
3.0 to <3.5	17	9	8	6	5	4	3	3
3.5 to <4.0	18	12	10	8	6	6	3	3
$\geq$ 4.0	22	16	13	11	8	8	4	3

Credits are only available for central systems that provide not less than 80% of total system volume in the building.

**Table 11.703.5.1(2)(d)**  
**Electric Tabletop Water Heating**  
**(Tabletop Water Heater, Rated Storage Volume  $\geq$  20 Gallons and  $\leq$  120 Gallons, Medium Water Draw)**

Uniform Energy Factor	Climate Zone							
	1	2	3	4	5	6	7	8
	<b>POINTS</b>							
$\geq$ 0.91	1	1	1	1	1	1	1	1

**Table 11.703.5.1(2)(e)**  
**Electric Instantaneous Water Heating<sup>a</sup>**  
**(Instantaneous Electric Water Heater, Rated Storage Volume < 2 Gallons,**  
**Medium Water Draw)**

Uniform Energy Factor or Thermal Efficiency <sup>b</sup>	Climate Zone							
	1	2	3	4	5	6	7	8
	<b>POINTS</b>							
$\geq$ 0.97	2	2	2	2	2	2	2	2

a. Applies to any size water heater.

b. Electric instantaneous water heaters have either a Uniform Energy Factor (capacity less than or equal to 12 kW) or a Thermal Efficiency (capacity greater than 12 kW).

**Table 11.703.5.1(2)(f)**  
**Electric Grid Enabled Water Heating**  
**(Grid Enabled Storage Water Heater, Rated Storage Volume  $\geq$  75 Gallons,**  
**Medium Water Draw)**

Uniform Energy Factor	Climate Zone							
	1	2	3	4	5	6	7	8
	<b>POINTS</b>							

≥0.95	1	1	1	1	1	1	1	1
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(3) Oil water heating

Per Table  
11.703.5.1(3)

**Table 11.703.5.1(3)**  
**Oil Water Heating**  
**(Oil Water Heating, < 50 Gallons, Medium Water Draw)**

Uniform Energy Factor	Climate Zone							
	1	2	3	4	5	6	7	8
≥0.62	1	1	1	1	1	1	1	1

11.703.5.2 Desuperheater is installed by a qualified installer or is pre-installed in the factory.

Per Table  
11.703.5.2

**Table 11.703.5.2**  
**Desuperheater**

Climate Zone						
1	2	3	4	5	6	7-8
<b>POINTS</b>						
23	17	9	7	5	4	2

11.703.5.3 Drain-water heat recovery system is installed. [Points awarded per building.]..... 2

11.703.5.4 Indirect-fired water heater storage tanks heated from boiler systems are installed. .... 1

11.703.5.5 Solar water heater. SRCC (Solar Rating & Certification Corporation) OG 300 rated, or equivalent, solar domestic water heating system is installed. Solar Energy Factor (SEF) as defined by SRCC is in accordance with Table 11.703.5.5(a) and Table 11.703.5.5(b).

Per Table  
11.703.5.5(a)  
or  
11.703.5.5(b)

**Table 11.703.5.5(a)**  
**Storage Water Heater, Rated Storage Volume of Backup Water Heater**  
**is ≥ 0.1 Gallon and ≤ 55 Gallons, Medium Water Draw**

SEF	Climate Zone						
	Tropical & 1	2	3	4	5	6	7-8
<b>POINTS</b>							
SEF ≥ 1.3	1	2	3	5	6	7	6
SEF ≥ 1.51	2	2	4	6	9	10	10
SEF ≥ 1.81	2	3	5	9	13	14	14
SEF ≥ 2.31	4	5	8	14	19	21	20
SEF ≥ 3.01	5	7	11	21	27	31	30

**Table 11.703.5.5(b)**  
**Storage Water Heater, Rated Storage Volume of Backup Water Heater**  
**is >55 Gallons, Medium Water Draw**

SEF	Climate Zone						
	Tropical & 1	2	3	4	5	6	7-8
<b>POINTS</b>							
SEF ≥ 1.3	1	1	2	3	4	5	4
SEF ≥ 1.51	1	1	2	4	6	7	7
SEF ≥ 1.81	1	2	4	6	8	10	9
SEF ≥ 2.31	2	3	5	10	13	14	13
SEF ≥ 3.01	4	5	7	14	18	20	20

## 11.703.6 Lighting and appliances

**11.703.6.1 Interior hard-wired lighting.** Interior hard-wired lighting is in accordance with one of the following:

- (1) Not less than 95% of the total hard-wired interior luminaires or lamps comply with the following efficacy levels (lumens per watt):
  - (a) 80 lumens per watt ..... 3
  - (b) 100 lumens per watt..... 5
- (2) Lighting power densities (LPD) in common areas of multi-dwelling or multi-sleeping unit buildings shall be less than:
  - (a) 0.40 Watts per square foot ..... 3
  - (b) 0.35 Watts per square foot ..... 5

**11.703.6.2 Exterior hard-wired lighting.** Not less than 80% of the exterior lighting has a efficacy of not less than 100 lumens per watt or is solar-powered. .... 3

### 11.703.6.3 Appliances.

- (1) ENERGY STAR or equivalent appliance(s) are installed:
  - (a) Refrigerator ..... 1
  - (b) Dishwasher ..... 1
  - (c) Clothes washer ..... 4
  - (d) Clothes dryer ..... 1
- (2) Install Consortium for Energy Efficiency (CEE) Tier 2 or higher tier appliances for the below types of appliances:
  - (a) Refrigerator ..... 3
  - (b) Dishwasher ..... 2
  - (c) Clothes dryer ..... 5
  - (bd) Clothes dryer ..... 3

## 11.703.7 Passive solar design

**11.703.7.1 Sun-tempered design.** Building orientation, sizing of glazing, and design of overhangs are in accordance with all of the following: ..... 4

- (1) The long side (or one side if of equal length) of the building faces within 20 degrees of true south.
- (2) Vertical glazing area on the south face is between 5% and 7% of the gross conditioned floor area [also see § 11.703.7.1(8)], and glazing U-factors complying with Table 11.703.2.5.2(a).
- (3) Vertical glazing area on the west face is less than 2% of the gross conditioned floor area, and glazing complies with Table 11.703.2.5.2(a).

- (4) Vertical glazing area on the east face is less than 4% of the gross conditioned floor area, and glazing complies with Table 11.703.2.5.2(a).
- (5) Vertical glazing area on the north face is less than 8% of the gross conditioned floor area, and glazing complies with Table 11.703.2.5.2(a).
- (6) Skylights, where installed, are in accordance with the following:
  - (a) shades and insulated wells are used, and all glazing complies with Table 11.703.2.5.2(a).
  - (b) horizontal skylights are less than 0.5% of finished ceiling area.
  - (c) sloped skylights on slopes facing within 45 degrees of true south, east, or west are less than 1.5% of the finished ceiling area.
- (7) Overhangs, adjustable canopies, awnings, or trellises provide shading on south-facing glass for the appropriate climate zone in accordance with Table 11.703.7.1(7):

**Table 11.703.7.1(7)  
South-Facing Window Overhang Depth**

		Vertical distance between bottom of overhang and top of window sill				
		≤7' 4"	≤6' 4"	≤5' 4"	≤4' 4"	≤3' 4"
Climate Zone	1 & 2 & 3	2' 8"	2' 8"	2' 4"	2' 0"	2' 0"
	4 & 5 & 6	2' 4"	2' 4"	2' 0"	2' 0"	1' 8"
	7 & 8	2' 0"	1' 8"	1' 8"	1' 4"	1' 0"

For SI: 1 in. = 25.4 mm

- (8) The south facing windows have an SHGC of 0.40 or higher.
- (9) Return air or transfer grilles/ducts are in accordance with § 11.705.4.

**Multifamily Building Note:** *The site is designed such that not less than 40% of the multifamily dwelling or sleeping units have one south facing wall (within 15 degrees) containing not less than 50% of glazing for entire unit, Effective shading is required for passive solar control on all south facing glazing. The floor area of not less than 15 ft from the south facing perimeter glazing is massive and exposed to capture solar heat during the day and reradiate at night.*

**11.703.7.2 Window shading.** Automated solar protection or dynamic glazing is installed to provide shading for windows. .... **1**

**11.703.7.3 Passive cooling design.** Passive cooling design features are in accordance with at least three of the following: [1 additional point awarded for each additional item.] ..... **3 [6 max]**

- (1) Exterior shading is provided on east and west windows using one or a combination of the following:
  - (a) vine-covered trellises with the vegetation separated by not less than 1 ft (305 mm) from face of building.
  - (b) moveable awnings or louvers.
  - (c) covered porches.



- (d) attached or detached conditioned/unconditioned enclosed space that provides full shade of east and west windows (e.g., detached garage, shed, or building).
- (2) Overhangs are installed to provide shading on south-facing glazing in accordance with § 11.703.7.1(7).

*Points not awarded if points are taken under § 11.703.7.1.*

- (3) Windows and/or venting skylights are located to facilitate cross and stack effect ventilation.
- (4) Solar reflective roof or radiant barrier is installed in climate zones 1, 2, or 3 and roof material achieves a 3-year aged criteria of 0.50.
- (5) Internal exposed thermal mass is not less than 3 in. (76 mm) in thickness. Thermal mass consists of concrete, brick, and/or tile fully adhered to a masonry base or other masonry material in accordance with one or a combination of the following:
  - (a) Not less than 1 ft<sup>2</sup> (0.09 m<sup>2</sup>) of exposed thermal mass of floor per 3 ft<sup>2</sup> (2.8 m<sup>2</sup>) of gross finished floor area.
  - (b) Not less than 3 ft<sup>2</sup> (2.8 m<sup>2</sup>) of exposed thermal mass in interior walls or elements per ft<sup>2</sup> (0.09 m<sup>2</sup>) of gross finished floor area.
- (6) Roofing material is installed with not less than a 0.75 in. (19 mm) continuous air space offset from the roof deck from eave to ridge.

**11.703.7.4 Passive solar heating design.** In addition to the sun-tempered design features in § 11.703.7.1, all of the following are implemented: *[Points shall not be awarded in the Tropical Climate Zone]*..... **4**

- (1) Additional glazing, no greater than 12%, is permitted on the south wall. This additional glazing is in accordance with the requirements of § 11.703.7.1.
- (2) Additional thermal mass for any room with south-facing glazing of more than 7% of the finished floor area is provided in accordance with the following:
  - (a) Thermal mass is solid and not less than 3 in. (76 mm) in thickness. Where two thermal mass materials are layered together (e.g., ceramic tile on concrete base) to achieve the appropriate thickness, they are fully adhered to (touching) each other.
  - (b) Thermal mass directly exposed to sunlight is provided in accordance with the following minimum ratios:
    - (i) Above latitude 35 degrees: 5 ft<sup>2</sup> (0.465 m<sup>2</sup>) of thermal mass for every 1 ft<sup>2</sup> (0.093 m<sup>2</sup>) of south-facing glazing.
    - (ii) Latitude 30 degrees to 35 degrees: 5.5 ft<sup>2</sup> (0.51 m<sup>2</sup>) of thermal mass for every 1 ft<sup>2</sup> (0.093 m<sup>2</sup>) of south-facing glazing.
    - (iii) Latitude 25 degrees to 30 degrees: 6 ft<sup>2</sup> (0.557 m<sup>2</sup>) of thermal mass for every 1 ft<sup>2</sup> (0.093 m<sup>2</sup>) of south-facing glazing.
  - (c) Thermal mass not directly exposed to sunlight is permitted to be used to achieve thermal mass requirements of § 11.703.7.4(2) based on a ratio of 40 ft<sup>2</sup> (3.72 m<sup>2</sup>) of thermal mass for every 1 ft<sup>2</sup> (0.093 m<sup>2</sup>) of south-facing glazing.

- (3) In addition to return air or transfer grilles/ducts required by § 11.703.7.1(9), provisions for forced airflow to adjoining areas are implemented as needed.

**11.704 ERI TARGET PATH**

**STAFF NOTE:** Language from A009 and A010, that was Accepted As Modified by the Consensus Committee at their November 8-10, 2022 meeting, was not fully incorporated into the first draft standard but is included in this draft standard.

**11.704.1 ERI target compliance.** Compliance shall be determined in accordance with ANSI/RESNET/ICC 301. Points from § 11.704 (ERI Target) shall not be combined with points from § 11.702 (Performance Path), § 11.703 (Prescriptive Path), or 11.701.1.4 through 11.701.1.8 (Alternative Paths).

Dwelling ratings shall be submitted to a Rating Certification Body approved by the Adopting Entity for calculating points under this section.

**11.704.2 Point calculation.** Points for § 11.704 shall be computed individually for each building as follows:

Points = 40 + (Applicable Energy Rating Index from Table 11.704.2) \* 2

**Table 11.704.2**  
**Energy Rating Index of the Rated Design**

Climate Zone							
0-1	2	3	4	5	6	7	8
ENERGY RATING INDEX							
52	52	51	54	55	54	53	53

**Multifamily Building Note:** Modeling is completed building-wide using either a unit-by-unit approach, or a building average of a unit-by-unit approach.

**11.705 ALTERNATIVE COMPLIANCE FOR TROPICAL ZONES**

**STAFF NOTE:** Language from A009 and A010, that was Accepted As Modified by the Consensus Committee at their November 8-10, 2022 meeting, was not fully incorporated into the first draft standard but is included in this draft standard.

**11.705.1 Mandatory practices**

**11.705.1.1 High-efficacy lighting.** All permanently installed lighting fixtures, excluding appliance lighting fixtures, shall contain only high-efficacy lighting sources.

**11.705.1.2 Attics.** Attics above the insulation are vented and attics below the insulation are unvented.

**11.705.1.3 Roofs.** Roof surfaces have a slope of not less than 1/4 unit vertical in 12 units horizontal (2.0-percent slope). The roof does not have water accumulation areas.

**11.705.1.4 Operable fenestration**

**11.705.1.4.1 Ventilation area.** Operable fenestration provides an openable area of not less than 10 percent of the floor area of the living space.

**11.705.1.4.2 Bedroom exterior walls.** Bedrooms with exterior walls facing two or more directions have operable fenestration on exterior walls facing not less than two directions.

**11.705.1.4.3 Glazing in conditioned spaces.** Glazing in conditioned spaces has a solar heat gain coefficient (SHGC), in accordance with § 11.705.2.2 or § 11.705.3.2, or has an overhang with a projection factor equal to or greater than 0.30 and a solar heat gain coefficient of no greater than 0.30.

**Exception:** jalousie windows.

**11.705.1.5 Interior doors.** Bedroom doors are capable of being secured in an open position.

## 11.705.2 Additional Tropical Zone practices - Silver

**11.705.2.1 Water Heater.** A renewable energy source provides not less than 80% of annual service water heating needs.

**11.705.2.2 Glazing.** Glazing in conditioned space has a Solar Heat Gain Coefficient (SHGC) between 0.26 and 0.30.

**11.705.2.3 Exterior Walls.** Exterior walls comply with not less than one of the following:

- (1) Walls have insulation with an R-value of R-13 or greater.
- (2) Wall products have a minimal initial solar reflectance of not less than 0.64. Wall products shall be tested in accordance with Chapter 3 testing requirements of CRR-2.

**11.705.2.4 Roof.** The exterior roof surface complies with not less than one of the following:

- (1) Not less than an initial solar reflectance of 0.75 and emittance of 0.75.
- (2) Not less than an initial solar reflectance index of 75 and thermal emittance of 0.75. Roof products are tested in accordance with the ANSI/CRR S100.
- (3) Roof or ceiling insulation with R-Value of R-13 or greater.
- (4) Radiant barrier installed.

**11.705.2.5 Ceiling fans.** A ceiling fan rough-in is provided for bedrooms and the largest living space that is not used as a bedroom.

**11.705.2.6 Electric vehicle charging.** Wiring sufficient for a Level 2 (208/240V 32-80 amp) electric vehicle charging station is installed on the building site.

## 11.705.3 Additional Tropical Zone practices - Gold

**11.705.3.1 Water Heater.** A renewable energy source provides not less than 90% of annual service water heating needs.

**11.705.3.2 Glazing.** Glazing in conditioned space has a Solar Heat Gain Coefficient (SHGC) not less than 0.25.

**11.705.3.3 Exterior Walls.** Exterior walls comply with the following:

- (1) Walls have insulation with an R-value of R-13 or greater.

- (2) Wall products have a minimal initial solar reflectance of not less than 0.64. Wall products shall be tested in accordance with Chapter 3 testing requirements of CRR-2.

**11.705.3.4 Roof.** The exterior roof surface complies with not less than two of the following:

- (1) Not less than an initial solar reflectance of 0.75 and emittance of 0.75.
- (2) Not less than an initial solar reflectance index of 75 and thermal emittance of 0.75. Roof products are tested in accordance with the ANSI/CRR-2 S100.
- (3) Roof or ceiling insulation with R-Value of R-13 or greater.
- (4) Radiant barrier installed.

**11.705.3.5 Ceiling fans.** A ceiling fan is provided for bedrooms and the largest living space that is not used as a bedroom.

**11.705.3.6 Air conditioning.** All installed air conditioners have a rating of not less than 18 SEER2.....

**11.705.3.7 Renewable energy system.** For each dwelling unit, the building or lot is served by not less than 2kW renewable energy system and not less than 6kWh of energy storage. ....

**11.705.3.8 Electric vehicle charging.** A Level 2 (208/240V 32-80 amp) electric vehicle charging station is installed on the building site.

**11.706 ADDITIONAL PRACTICES**

**11.706.1 Application of additional practice points.** Points from § 11.706 can be added to points earned in § 11.703 (Prescriptive Path), § 11.703 (Prescriptive Path), § 11.704 (ERI Target Path), or § 11.701.1.4 through § 11.701.1.8 (Alternative Paths)..

**11.706.2 Lighting**

**11.706.2.1 Lighting controls**

*Percentages for point thresholds are based on lighting not required for means of egress or security lighting as defined by local building codes.*

**11.706.2.1.1 Interior lighting.** In dwelling units or sleeping units, permanently installed interior lighting fixtures are controlled with an occupancy sensor, or dimmer:

- (1) greater than 50% to less than 75% of lighting fixtures. .... **1**
- (2) not less than 75% of lighting fixtures..... **2**

**11.706.2.1.2 Exterior lighting.** Photo or motion sensors are installed on 75% of outdoor lighting fixtures to control lighting.  
*[Percentages for point thresholds do not include lighting equipped with photovoltaics.]..... **1***

**11.706.2.1.3 Multifamily common areas**

- (1) In a multifamily building, occupancy sensors, or dimmers are installed in common areas (except corridors and stairwells).
  - (a) greater than 50% to less than 75% of lighting fixtures. .... **1**
  - (b) not less than 75% of lighting fixtures. .... **2**

(2) In a multifamily building, occupancy controls are installed to automatically reduce light levels in interior corridors and exit stairwells when the space is unoccupied. Light levels are reduced by:

- (a) greater than 50% to less than 75% or to local minimum requirements ..... 2
- (b) not less than 75% ..... 3

**11.706.2.1.4** In a multifamily building, occupancy controls are installed to automatically reduce light levels in garages and parking structures when the space is unoccupied. Light levels are reduced by:

- (1) greater than 50% to less than 75% or to local minimum requirements ..... 2
- (2) not less than 75% ..... 3

**11.706.2.2 TDDs and skylights.** A tubular daylighting device (TDD) or a skylight that complies with the requirements of Table 11.703.2.5.2(a) is installed in rooms without windows.

*[Points awarded per building.]* ..... 2

**11.706.2.3 Lighting outlets.** Occupancy sensors are installed for not less than 80% of hard-wired lighting outlets in the interior living space. .... 1

**11.706.2.4 Recessed luminaires.** The number of recessed luminaires that penetrate the thermal envelope is less than 1 per 400 ft<sup>2</sup> (37.16 m<sup>2</sup>) of total conditioned floor area and they are in accordance with § 11.701.4.3.5. .... 1

**11.706.3 Induction cooktop.** Induction cooktop is installed. .... 1

**11.706.4 Return ducts and transfer grilles.** Return ducts or transfer grilles are installed in every room with a door. Return ducts or transfer grilles are not required for bathrooms, kitchens, closets, pantries, and laundry rooms..... 2

**11.706.5 HVAC design and installation**

**11.706.5.1** Comply with at least one of the following:

- (1) HVAC contractor is certified by the Air Conditioning Contractors of America’s Quality Assured Program (ACCA/QA), an EPA-recognized HVAC Quality Installation Training Oversight Organization (H-QUITO) , the Associated Air Balance Council (AABC) Test and Balance Technician or Engineer programs, the National Environmental Balancing Bureau (NEBB) Personnel Certification program, or Testing, Adjusting, and Balance Bureau (TABB) technician certification program. .... 1
- (2) HVAC installation technician(s) is certified by North American Technician Excellence, Inc. (NATE) or equivalent. .... 2

**11.706.5.2** Performance of the heating and/or cooling system is verified by the HVAC contractor in accordance with all of the following: ..... 3

- (1) Start-up procedure is performed in accordance with the manufacturer’s instructions.
- (2) Refrigerant charge is verified by super-heat and/or sub-cooling method.
- (3) Burner is set to fire at input level listed on nameplate.
- (4) Air handler setting/fan speed is set in accordance with manufacturer’s instructions.
- (5) Total airflow is within 10% of design flow.

(6) Total external system static does not exceed equipment capability at rated airflow.

**11.706.5.3 HVAC Design is verified by 3rd party as follows:**

- (1) The ENERGY STAR HVAC Design and Rater Design Review Checklists are completed and correct. .... 3
- (2) HVAC Installation is inspected and conforms to HVAC design documents and plans. .... 3

**11.706.6 Installation and performance verification**

**11.706.6.1** Third-party on-site inspection is conducted to verify compliance with all of the following, as applicable. No less than two inspections are performed: one inspection after insulation is installed and prior to covering, and another inspection upon completion of the building. Where multiple buildings or dwelling units of the same model or sleeping units of the same model are built by the same builder, a representative sample inspection of not less than 15% of the buildings or dwelling units or sleeping units is permitted. .... 3

- (1) Ducts are installed in accordance with the IRC or IMC and ducts are sealed.
- (2) Building envelope air sealing is installed.
- (3) Insulation is installed in accordance with § 11.701.4.3.2.1.
- (4) Windows, skylights, and doors are flashed, caulked, and sealed in accordance with manufacturer’s instructions and in accordance with § 11.701.4.3.

**11.706.6.2 Testing.** Testing is conducted to verify performance.

**11.706.6.2.1 Air leakage validation of building or dwelling units or sleeping units.** A visual inspection is performed as described in § 11.701.4.3.2(2) and air leakage testing is performed in accordance with ANSI/RESNET/ICC 380, ASTM E779, ASTM E1827, or ASTM E3158.  
*[Points awarded only for buildings where building envelope leakage testing is not required by the IECC.]*  
*[Points not awarded if points are taken under § 11.703.2.4.]*

- (1) A blower door test. .... 3
- (2) Third-party verification is completed. .... 5

**11.706.6.2.2 HVAC airflow testing.** Balanced HVAC airflows are demonstrated by flow hood or other acceptable flow measurement tool by a third party. Test results are in accordance with the following:

- (1) Measured flow at each supply and return register complies with or exceeds the requirements in ACCA 5 QI Section 5.2. .... 5
- (2) Total airflow complies with or exceeds the requirements in ACCA 5 QI Section 5.2..... 3

**11.706.6.2.3 HVAC duct leakage testing.** One of the following is achieved:  
*[Points awarded only for buildings where duct leakage testing is not required by IECC.]*  
*[Points not awarded if points are taken under § 11.703.4.4.]*

- (1) Duct leakage is in accordance with IECC R403.3.5 and R403.3.6. .... 3
- (2) Duct leakage is in accordance with IECC R403.3.5 and R403.3.6, and testing is conducted by an independent third party. .... 5

**11.706.6.3 Insulating hot water pipes.** Insulation with a thermal resistance (R-value) of not less than R-3 is applied to the following, as applicable:  
*[Points awarded only where these practices are not required by IECC.]*..... **1**

- (a) piping 3/4-in. and larger in outside diameter.
- (b) piping serving more than one dwelling unit or sleeping unit.
- (c) piping located outside the conditioned space.
- (d) piping from the water heater to a distribution manifold.
- (e) piping located under a floor slab.
- (f) buried piping.
- (g) supply and return piping in recirculation systems other than demand recirculation systems.

**11.706.6.4 Potable hot water demand re-circulation system**

**11.706.6.4.1** Potable hot water demand re-circulation system is installed in a single-family unit. .... **1**

**11.706.6.4.2** Potable hot water demand re-circulation system(s) that serves every unit in a multifamily building is installed in place of a standard circulation pump and control. .... **2**

**11.706.7 Submetering system.** In multifamily buildings, an advanced electric and fossil fuel submetering system is installed to monitor electricity and fossil fuel consumption for each unit. The device provides consumption information on a monthly or near real-time basis. The information is available to the occupants not less than on a monthly basis. .... **1**

**11.707 INNOVATIVE PRACTICES**

**11.707.1 Energy consumption control.** A whole-building, whole-dwelling unit, or whole-sleeping unit device or system is installed that controls or monitors energy consumption. .... **3 max**

- (1) programmable communicating thermostat with the capability to be controlled remotely ..... **1**
- (2) energy-monitoring device or system ..... **1**
- (3) energy management control system ..... **3**
- (4) programmable thermostat with control capability based on occupant presence or usage pattern **1**
- (5) lighting control system ..... **1**

**11.707.2 Renewable energy service plan.** Renewable energy service plan is provided as follows:

- (1) Builder selects a renewable energy service plan provided by the local electrical utility for interim (temporary) electric service, or purchases renewable energy certificates (RECs) from a third-party provider to cover electricity used. The builder’s local administrative office has renewable energy service or has otherwise been paired with RECs. Green-e Certified or equivalent is required for renewable electricity purchases. .... **1**
- (2) The buyer of the building selects one of the following renewable energy service plans provided by the utility prior to occupancy of the building with no less than a two-year commitment or buys

RECs from a third-party provider to match the estimated projected electricity use for the building for two years. Green-e Certified (or equivalent) is required for renewable electricity purchases.

- (a) less than 50% of the building common area has a projected electricity and gas use that is provided by renewable energy..... **1**
- (b) greater than or equal to 50% of the building common area has a projected electricity and gas use that is provided by renewable energy..... **2**
- (c) the entire building (all units and common areas included) has a projected electricity and gas use that is provided by renewable energy. .... **5**

**11.707.3 Smart appliances and systems.** Smart appliances and systems are installed as follows:

*[1 point awarded where at least 3 smart appliances are installed; 1 additional point awarded for 6 or more.]*..... **1 [2 max]**

- (1) Refrigerator
- (2) Freezer
- (3) Dishwasher
- (4) Clothes Dryer
- (5) Clothes Washer
- (6) Room Air Conditioner
- (7) HVAC Systems
- (8) Service Hot Water Heating Systems

*[Items (7) and (8) are permitted to count as two appliances each for the purpose of awarding points.]*

*Where points awarded in § 11.707.3, points shall not be awarded in § 11.707.7 and § 11.707.10.*

**11.707.4 Pumps**

**11.707.4.1** Pool or spa equipped with filtration pumps that are ENERGY STAR certified or equivalent are installed.

- (1) Pool is equipped with ENERGY STAR certified or equivalent filtration pump(s). .... **3**
- (2) Spa is equipped with ENERGY STAR certified or equivalent filtration pump(s). .... **1**

**11.707.4.2** All sump pump(s) with electronically commutated motors (ECMs) are installed. .... **1**

**11.707.5 On-site renewable energy system.** One of the following options is implemented:

- (1) Building is Solar-Ready in compliance with IECC Appendix RB or CB Solar-Ready Provisions, as applicable. .... **1**
- (2) An on-site renewable energy system(s) is installed on the property. .... **2 per kW**



- (3) An on-site renewable energy system(s) and a battery energy storage system are installed on the property.  
 [2 points awarded per kW or renewable energy system plus 1 per each 2 kWh or battery energy storage system]..... **2 per kW**

*Points shall not be awarded in this section for solar thermal or geothermal systems that provide space heating, space cooling, or water heating, points for these systems are awarded in § 11.703. Points awarded in this section shall not be combined with points for renewable energy in another section of this chapter. The solar-ready zone roof area in item (1) is area per dwelling unit. Points in item (2) and (3) shall be divided by the number of dwelling units.*

**Multifamily Building Note:** Conditioned common area and non-residential space is excluded for the purpose of calculating number of units.

**11.707.6 Parking garage efficiency.** Structured parking garages are designed to require no mechanical ventilation for fresh air requirements. .... **2**

**11.707.7 Grid-interactive electric thermal storage system.** A grid-interactive electric thermal storage system is installed.

- (1) Grid-Interactive Water Heating System ..... **1**
- (2) Grid-Interactive Space Heating and Cooling System ..... **1**

*Where points are awarded in § 11.707.7, points shall not be awarded in § 11.707.3 and § 11.707.10.*

**11.707.8 Single-family residence electrical vehicle chargers.** A Level 2 (208/240V 40-80 amp) or Level 3 electric vehicle charging station:

- (1) is installed on the building site. (Note: Charging station shall not be included in the building energy consumption.)..... **2**
- (2) is ENERGY STAR certified or equivalent..... **1 Additional**

**11.707.9 Single-family residence CNG vehicle fueling station.** A CNG vehicle residential fueling appliance is installed on the building site. The CNG fueling appliances shall be listed in accordance with ANSI/CSA NGV 5.1 and installed in accordance to the appliance manufacturer’s installation instructions. (Note: The fueling appliance shall not be included in the building energy consumption.) ..... **1**

**11.707.10 Automatic demand response.** Automatic demand response system is installed that curtails energy usage upon a signal from the utility or an energy service provider is installed. .... **1**

*Where points are awarded in § 11.707.10, points shall not be awarded in § 11.707.3 and § 11.707.7.*

**11.707.11 Grid-interactive battery storage system.** A grid-interactive battery storage system of no less than 6 kWh of available capacity is installed. .... **2**

**11.707.12 Smart ventilation**

- (1) A whole-building ventilation system is installed with automatic ventilation controls to limit ventilation during periods of extreme temperature, extreme humidity, and/or during times of ..... **1**

peak utility loads and is in accordance with the specifications of ASHRAE Standard 62.2 Section 4 .....

- (2) Install a demand-controlled ventilation system to reduce outside air ventilation rates that is in accordance with specifications of ASHRAE Standard 62.2 Section 4 ..... 1

**11.707.13 Alternative refrigerant.** Use of the following in mechanical space cooling systems for dwellings.

- (1) Use alternative refrigerant with a GWP less than 1,000 ..... 1
- (2) Do not use refrigerants ..... 2

**11.707.14 Third-party utility benchmarking service**

- (1) For a multifamily building, the owner has contracted with a third-party utility benchmarking service with not less than five (5) years of experience in utility data management and analysis to perform a monthly analysis of whole-building energy and water consumption for not less than one (1) year. .... 3
- (2) The building owner commits to reporting energy data using EPA’s ENERGY STAR Portfolio Manager for not less than three (3) years..... 1

**11.707.15 Entryway air seal.** For multifamily buildings, where not required by the building or energy code, to slow the movement of unconditioned air from outdoors to indoors at the main building entrance, the following is installed:

- (1) Building entry vestibule..... 2
- (2) Revolving entrance doors..... 2

**11.801 INDOOR AND OUTDOOR WATER USE**

**11.801.0 Intent.** Implement measures that reduce indoor and outdoor water usage. Implement measures that include collection and use of alternative sources of water. Implement measures that treat water on site.

**11.801.1 Mandatory requirements.** The building shall comply with one of the following:

- (1) § 11.801.1.1 (Water Consumption Reduction Path);
- (2) § 11.801.1.2 (EPA Water Score Path);  
§ 11.802 (Prescriptive Path) and § 11.803 (Innovative Practices); or
- (3) § 11.804 (Performance Path).

~~11.802 (Prescriptive Path) and § 11.803 (Innovative Practices).~~ Points from § 11.804 (Performance Path) shall not be combined with points from § 11.802 (Prescriptive Path) or § 11.803 (Innovative Practices). The mandatory provisions of § 11.802 (Prescriptive Path) are required when using the Water Rating Index of § 804 (Performance Path) for Chapter 8 Water Efficiency compliance.

11.801.1.1 Water Consumption Reduction Path. The water efficiency rating level shall be based on the reduction in water consumption resulting from the remodel in accordance with Table 305.2.6.

Water consumption shall be based on the estimated annual use as determined by a third-party audit and analysis or use of utility consumption data. The reduction shall be the percentage difference between the consumption before and after the remodel calculated as follows:

$$\frac{[(\text{consumption per bedroom before remodel} - \text{consumption per bedroom after remodel}) / \text{consumption per bedroom before remodel}] * 100\%}{}$$

The occupancy and lifestyle assumed and the method of making the water consumption estimates shall be the same for estimates before and after the remodel. The building configuration for the after-remodel estimate shall include any changes to the configuration of the building such as additions or new points of water use. For multifamily buildings, the water consumption shall be based on the entire building including all dwelling units and common areas.

Where a building can demonstrate through documentation approved by the Adopting Entity that the remodel activities started prior to project registration, the water baseline (consumption before remodel) shall be calculated based on data and building systems that existed in the building up to 3 years prior project registration.

**11.801.1.2 EPA Water Score Path.** The Multifamily property shall be scored in the EPA ENERGY STAR Portfolio Manager tool following EPA requirements and guidance or equivalent tool or program. The last month in the 12-month water data period for this water score shall be within 6 months prior to acceptance by the Adopting Entity. Where total property water data is not available, then the score can be generated with 100% actual common and non-residential area water usage and not less than 80% of the actual tenant water meters, which has been extrapolated to 100%. All water data and extrapolation methods shall be reported. The level awarded for the Water Section shall be based on Table 305.2.6.

**11.802 PRESCRIPTIVE PATH**

**11.802.0 Minimum prescriptive path requirements.** A building complying with § 11.802 (Prescriptive Path) shall obtain not less than 8 points in practices § 11.802.4 through § 11.802.6 and not less than 4 points in practice § 11.802.7.

**11.802.1 Indoor hot water usage.** Indoor hot water supply system is in accordance with one of the practices listed in items (1) through (5). The maximum water volume from the source of hot water to the termination of the fixture supply is determined in accordance with Tables 11.802.1(1) or 11.802.1(2). The maximum pipe length from the source of hot water to the termination of the fixture supply is 50 ft

*Where more than one water heater or where more than one type of hot water supply system, including multiple circulation loops, is used, points are awarded only for the system that qualifies for the minimum number of points. Systems with circulation loops are eligible for points only where pumps are demand controlled. Circulation systems with timers or aquastats and constant-on circulation systems are not eligible to receive points. Points awarded only where the pipes are insulated in accordance with § 11.705.6.3.*

- (1) The maximum volume from the water heater to the termination of the fixture supply at furthest fixture is 128 ounces (1 gallon or 3.78 liters)..... **8**
- (2) The maximum volume from the water heater to the termination of the fixture supply at furthest fixture is 64 ounces (0.5 gallon or 1.89 liters)..... **12**

- (3) The maximum volume from the water heater to the termination of the fixture supply at furthest fixture is 32 ounces (0.25 gallon or 0.945 liters). ..... **20**
- (4) A demand controlled hot water priming pump is installed on the main supply pipe of the circulation loop and the maximum volume from this supply pipe to the furthest fixture is 24 ounces (0.19 gallons or 0.71 liters). ..... **24**
  - (a) The volume in the circulation loop (supply) from the water heater or boiler to the branch for the furthest fixture is no more than 128 ounces (1 gallon or 3.78 liters). ..... **4 Additional**
- (5) A central hot water recirculation system is implemented in multifamily buildings in which the hot water line distance from the recirculating loop to the engineered parallel piping system (i.e., manifold system) is less than 30 ft (9,144 mm) and the parallel piping to the fixture fittings contains a maximum of 64 ounces (1.89 liters) (115.50 cubic in.) (0.50 gallons). ..... **9**
- (6) Tankless water heater(s) with not less than 0.5 gallon (1.89 liters) of storage are installed, or a tankless water heater that ramps up to not less than 110°F within 5 seconds is installed. The storage may be internal or external to the tankless water heater. .... **1 Additional**

**Table 11.802.1(1)  
Maximum Pipe Length Conversion Table<sup>a</sup>**

Nominal Pipe Size (in.)	Liquid Ounces per Foot of Length	Main, Branch, and Fixture Supply System Volume Category			Branch and Fixture Supply Volume from Circulation Loop
		128 ounces (1 gallons) [per 11.802.1(1)]	64 ounces (0.5 gallon) [per 11.802.1(2)]	32 ounces (0.25 gallon) [per 11.802.1(3)]	24 ounces (0.19 gallon) [per 11.802.1(4)]
		Maximum Pipe Length (feet)			
1/4 <sup>b</sup>	0.33	50	50	50	50
5/16 <sup>b</sup>	0.5	50	50	50	48
3/8 <sup>b</sup>	0.75	50	50	43	32
1/2	1.5	50	43	21	16
5/8	2	50	32	16	12
3/4	3	43	21	11	8
7/8	4	32	16	8	6
1	5	26	13	6	5
1 1/4	8	16	8	4	3
1 1/2	11	12	6	3	2
2	18	7	4	2	1

a. Maximum pipe length figures apply when the entire pipe run is one nominal diameter only. Where multiple pipe diameters are used, the combined volume shall not exceed the volume limitation in § 11.801.1.  
 b. The maximum flow rate through 1/4 in. nominal piping shall not exceed 0.5 gpm. The maximum flow rate through 5/16 in. nominal piping shall not exceed 1 gpm. The maximum flow rate through 3/8 in. nominal piping shall not exceed 1.5 gpm.

**Table 11.802.1(2)  
Common Hot Water Pipe Internal Volumes**

OUNCES OF WATER PER FOOT OF PIPE											
Size Nominal, In.	Copper Type M	Copper Type L	Copper Type K	CPVC CTS SDR 11	CPVC SCH 40	CPVC SCH 80	PE-RT SDR 9	Composite ASTM F 1281	PEX CTS SDR 9	PP SDR 7.4 F2389	PP SDR 9 F2389
3/8	1.06	0.97	0.84	N/A	1.17	N/A	0.64	0.63	0.64	N/A	N/A

1/2	1.69	1.55	1.45	1.25	1.89	1.46	1.18	1.31	1.18	1.72	1.96
3/4	3.43	3.22	2.90	2.67	3.38	2.74	2.35	3.39	2.35	2.69	3.06
1	5.81	5.49	5.17	4.43	5.53	4.57	3.91	5.56	3.91	4.41	5.01
1 ¼	8.70	8.36	8.09	6.61	9.66	8.24	5.81	8.49	5.81	6.90	7.83
1 ½	12.1 8	11.83	11.45	9.22	13.2	11.38	8.09	13.88	8.09	10.7 7	12.24
2	21.0 8	20.58	20.04	15.7 9	21.8 8	19.11	13.8 6	21.48	13.8 6	17.1 1	19.43

**11.802.2 Water-conserving appliances.** ENERGY STAR or equivalent water-conserving appliances are installed.

- (1) dishwasher ..... **2**
- (2) clothes washer, or ..... **6**
- (3) clothes washer with an Integrated Water Factor of 3.8 or less ..... **12**

**Multifamily Building Note:** *Washing machines are installed in individual units or provided in common areas of multifamily buildings.*

**11.802.3 Water usage metering.** Water meters are installed complying with the following:

- (1) Single-Family Buildings: Water Usage Metering: .....
  - (a) Where not otherwise required by the local AHJ, installation of a meter for water consumed from any source associated with the building or building site except for pools and spas. .... **2 per unique meter**
  - (b) Each water meter shall be capable of communicating water consumption data remotely for the dwelling unit occupant and be capable of providing daily data with electronic data storage and reporting capability that can produce reports for daily, monthly, and yearly water consumption. (Fire sprinkler systems are not required to be metered). .... **2 per sensor package**
- (2) Multifamily Buildings: Water Usage Metering: .....
  - (a) Where not otherwise required by the local AHJ, installation of a meter for water consumed from any source associated with the building or building site except for pools and spas. .... **2 per unique use meter**
  - (b) Each water meter shall be capable of communicating water consumption data remotely for the dwelling unit occupant and be capable of providing daily data with electronic data storage and reporting capability that can produce reports for daily, monthly, and yearly water consumption. (Fire sprinkler systems are not required to be metered). .... **2 per sensor package**

*[Points earned in § 11.802.3(2) shall not exceed 50% of the total points earned for the Indoor and Outdoor Water Use Category]*

**11.802.4 Showerheads.** Showerheads are in accordance with the following:

- (1) A 2.0 GPM limit shall apply to cumulative flow of all devices located less than 96 in. apart in individual/two-person shower compartments or 35 in. apart in gang or group showers (as measured horizontally). Showerheads shall comply with ASME A112.18.1/CSA B125.1 and shall comply with the performance criteria of the EPA WaterSense Specification for showerheads. Showerheads shall be served by an automatic compensating valve that complies with ASSE 1016/ASME A112.1016/CSA B125.16 or ASME A112.18.1/CSA B125.1 and is specifically **2 [7 max]**

designed to provide thermal shock and scald protection at the flow rate of the showerhead.  
 [4 points awarded for first compartment; 1 point for each additional compartment in dwelling]....

*Points awarded per shower compartment. In multifamily buildings, the average of the points assigned to individual dwelling units or sleeping units may be used as the number of points awarded for this practice, rounded to the nearest whole number.*

- (2) All shower compartments in the dwelling unit(s) or sleeping unit(s) and common areas meet the requirements of § 11.802.4(1) and all showerheads are in accordance with one of the following:
  - (a) maximum of 1.8 gpm..... **6 Additional**
  - (b) maximum of 1.5 gpm..... **10 Additional**
- (3) Any shower control that can shut off water flow without affecting temperature is installed.  
 [1 point awarded per shower control] ..... **1 [3 max]**

For SI: 1 gallon per minute = 3.785 L/m

### 11.802.5 Faucets

**11.802.5.1** Install water-efficient lavatory faucets with flow rates not more than 1.5 gpm (5.68 L/min), tested in compliance with ASME A112.18.1/CSA B125.1 and complying with the performance criteria of the EPA WaterSense High-Efficiency Lavatory Faucet Specification:

- (1) Flow rate ≤ 1.5 gpm [Faucets in all residential bathrooms are in compliance] ..... **1 [3 max]**

**Multifamily Building Note:** *In multifamily buildings, the average number of bathrooms per unit may be used as the number of points awarded for this practice, rounded to the nearest whole number.*

- (2) Flow rate ≤ 1.20 gpm [Faucets in all residential bathrooms are in compliance] ..... **2 [6 max]**

**Multifamily Building Note:** *In multifamily buildings, the average number of bathrooms per unit may be used as the number of points awarded for this practice, rounded to the nearest whole number.*

**11.802.5.2** Water-efficient residential kitchen faucets are installed in accordance with ASME A112.18.1/CSA B125.1. Residential kitchen faucets may temporarily increase the flow above the maximum rate but not to exceed 2.2 gpm.

- (1) All residential kitchen faucets have a maximum flow rate of 1.8 gpm. .... **3**
- (2) All residential kitchen faucets have a maximum flow rate of 1.5 gpm. .... **1 Additional**

**11.802.5.3** Self-closing valve, motion sensor, metering, or pedal-activated faucet is installed to enable intermittent on/off operation. [1 point awarded per fixture]..... **1 [3 max]**

### 11.802.6 Water closets and urinals.

Water closets and urinals are in accordance with the following:

*Points awarded for § 11.803.6(2) or § 11.802.6(3), not both.*

- (1) Gold and Emerald levels: All water closets and urinals are in accordance with § 11.802.6. .... **Mandatory**
- (2) A water closet is installed with an effective flush volume of 1.28 gallons (4.85 L) or less in accordance with ASME A112.19.2/CSA B45.1 or ASME A112.19.14 as applicable. Tank-type **2 [12 max]**

water closets shall be in accordance with the performance criteria of the EPA WaterSense Specification for Tank-Type Toilets .....

*[Points awarded per fixture. In multifamily buildings, the average of the points assigned to individual dwelling units or sleeping units may be used as the number of points awarded for this practice, rounded to the nearest whole number.]*

- (3) All water closets are in accordance with § 11.802.6(2). ..... **8**
- (4) All water closets are in accordance with § 11.802.6(2) **and** one or more of the following are met:
  - (a) Water closets that have an *effective flush volume* in accordance with one of the following:
    - [Points awarded per toilet. In multifamily buildings, the average of the points assigned to individual dwelling units or sleeping units may be used as the number of points awarded for this practice, rounded to the nearest whole number.]*
    - (i) between and including 0.9 and 1.2 gallons;..... **2 Additional**
    - (ii) less than 0.9 gallons. .... **4 Additional**
  - (b) One or more urinals with a flush volume of 0.5 gallons (1.9L) or less when tested in accordance with ASME A112.19.2/CSA B45.1. .... **2 Additional**
  - (c) One or more composting or non-flushing toilets or non-flushing urinals. Non-flushing toilets and urinals shall be tested in accordance with ASME A112.19.2/CSA B45.1. .... **12 Additional**

### 11.802.7 Irrigation systems

**11.802.7.1** Where an irrigation system is installed, an irrigation plan and implementation are executed by a qualified professional or equivalent. .... **Mandatory**

**11.802.7.2** Irrigation sprinkler nozzles shall be tested according to ANSI standard ASABE/ICC 802 Landscape Irrigation Sprinkler and Emitter Standard by an accredited third-party laboratory. .... **6**

**11.802.7.3** Drip irrigation is installed. .... **13 max**

- (1) Drip irrigation is installed for all landscape beds. **4**
- (2) Subsurface drip is installed for all turf grass areas. **4**
- (3) Drip irrigation zones specifications show plant type by name and water use/need for each emitter *[Points awarded only where specifications are implemented.]*..... **5**

**11.802.7.4** The irrigation system(s) is controlled by a smart controller or no irrigation is installed. *[Points are not additive.]*

- (1) Irrigation controllers shall be in accordance with the performance criteria of the EPA WaterSense program ..... **10**
- (2) No irrigation is installed and a landscape plan is developed in accordance with § 11.503.5, as applicable. .... **15**
- (2) No irrigation is installed and there is plan of no landscaping. .... **15**

**11.802.7.5 Commissioning and water use reduction for irrigation systems.**

*[Points are not additive per each section.]*

- (1) All irrigation zones utilize pressure regulation so emission devices (sprinklers and drip emitters) operate at manufacturer’s recommended operating pressure. .... 3
- (2) Where dripline tubing is installed, a filter with mesh size in accordance with the manufacturer’s recommendation is installed on all drip zones. .... 3
- (3) Utilize spray bodies that incorporate an in-stem or external flow shut-off device. .... 3
- (4) For irrigation systems installed on sloped sites, either an in-stem or external check valve is utilized for each spray body. .... 3
- (5) Where an irrigation system is installed, a flow sensing device is installed to monitor and alert the controller when flows are outside design range. .... 3

**11.802.8 Rainwater collection and distribution.** Rainwater collection and distribution is provided.

**11.802.8.1** Rainwater is used for irrigation in accordance with one of the following:

- (1) Rainwater is diverted for landscape irrigation without impermeable water storage ..... 5
- (2) Rainwater is diverted for landscape irrigation with impermeable water storage in accordance with one of the following:
  - (a) 50 – 499 gallon storage capacity ..... 5
  - (b) 500 – 2,499 gallon storage capacity ..... 10
  - (c) 2,500 gallon or larger storage capacity (system is designed by a professional certified by the ARCSA or equivalent) ..... 15
  - (d) All irrigation demands are met by rainwater capture (documentation demonstrating the water needs of the landscape are provided and the system is designed by a professional certified by the ARCSA or equivalent). .... 30

**11.802.8.2** Rainwater is used for indoor domestic demand as follows. The system is designed by a professional certified by the ARCSA or equivalent.

- (1) Rainwater is used to supply an indoor appliance or fixture for any locally approved use. *[Points awarded per appliance or fixture.]* ..... 5 [15 max]
- (2) Rainwater provides for total domestic demand. Where rainwater is used as potable water the potable rainwater system shall comply with the requirements of IRC Sections P2906 and Section P2912. .... 46

The following shall also apply:

- (a) The following roof materials shall not be used to collect rainwater: shingles with fire retardant, copper, and materials that contain asbestos. Materials that contain lead, including but not limited to flashings and roof jacks, shall be prohibited.
- (b) Potable water supplies shall be protected against cross connection with rainwater as specified in IRC Section P2902.1.
- (c) Disinfection shall be provided by at least one of the following:



- (i) Ultraviolet (UV) light providing not less than 40 mJ/cm<sup>2</sup> at 254 nm for the highest water flow rate. A UV sensor with visible alarm, audible alarm, or water shutoff shall be triggered when the UV light is below the minimum at the sensor. In addition, filtration no greater than 5 µm shall be located upstream of the UV light or
- (ii) filtration no greater than 0.2 µm, or
- (iii) other approved disinfection
- (d) Materials and systems that collect, convey, pump, or store rainwater for potable rainwater systems shall comply with NSF 53, NSF 61 or equivalent.
- (e) The quality of the water at the point of use shall be verified in accordance with the requirements of the jurisdiction.
- (f) The rainwater storage shall not admit sunlight.
- (g) Potable rainwater pipe shall not be required to be purple after the point that the water is disinfected.

**11.802.9 Sediment filters.** Water filter is installed to reduce sediment and protect plumbing fixtures for the whole building or the entire dwelling unit or the sleeping unit. .... **1**

**11.802.10 Water treatment devices**

**11.802.10.1** Water Softeners shall not be installed where the supplied water hardness is less than 8.0 grains per gallon measured as total calcium carbonate equivalents. Water softeners shall be listed to NSF 44 and a rated salt efficiency of 3,400 grains of total hardness per 1.0 pound of salt based on sodium chloride equivalency. Devices shall not discharge more than 4.0 gallons of water per 1,000 grains of hardness removed during the service or recharge cycle.

- (1) No water softener..... **5**
- (2) Water softener installed to supply softened water only to domestic water heater..... **2**

**11.802.10.2** Reverse Osmosis (R/O) water treatment systems shall be listed to NSF 58 and shall include automatic shut-off valve to prevent water discharge when storage tank is full.

- (1) No R/O system. .... **3**
- (2) Combined capacity of all R/O systems does not exceed 0.75 gallons. .... **1**

**11.802.11 Pools and spas**

**11.802.11.1** An motorized non-permeable pool cover is installed and extends across the entire pool surface. .... **10**

**11.803 INNOVATIVE PRACTICES**

**11.803.1 Reclaimed, grey, or recycled water.** Reclaimed, grey, or recycled water is used as permitted by applicable code.

*Points awarded for either § 11.803.1(1) or § 11.803.1(2), not both.*  
*Points awarded for either § 11.803.6 or § 11.803.1, not both.*

(1) each water closet flushed by reclaimed, grey, or recycled water  
 [Points awarded per fixture or appliance.] ..... **5 [20 max]**

(2) irrigation from reclaimed, grey, or recycled water on-site ..... **10**

**11.803.2 Reclaimed water, greywater, or rainwater pre-piping.** Reclaimed, greywater, or rainwater systems are rough plumbed (and permanently marked, tagged or labeled) into buildings for future use. .... **3 per roughed in system**

**11.803.3 Automatic leak detection and control devices.** One of the following devices is installed. Where a fire sprinkler system is present, ensure the device will be installed to not interfere with the operation of the fire sprinkler system. .... **2**

(1) automatic water leak detection and control devices

(2) automatic water leak detection and shutoff devices

**11.803.4 Engineered biological system or intensive bioremediation system.** An engineered biological system or intensive bioremediation system is installed and the treated water is used on site. Design and implementation are approved by appropriate regional authority. .... **20**

**11.803.5 Recirculating humidifier.** Where a humidifier is required, a recirculating humidifier is used in lieu of a traditional “flow through” type. .... **1**

**11.803.6 Advanced wastewater treatment system.** Advanced wastewater (aerobic) treatment system is installed and treated water is used on site. .... **20**

*Points awarded for either § 11.803.6 or § 11.803.1, not both.*

**11.804 PERFORMANCE PATH**

**STAFF NOTE:** Language from A009 and A010, that was Accepted As Modified by the Consensus Committee at their November 8-10, 2022 meeting, was not fully incorporated into the first draft standard but is included in this draft standard.

**11.804.1 Performance Path.** The index score for the Performance Path shall be calculated in accordance with Appendix D Water Rating Index (WRI) or equivalent methodology.

**11.804.2 Water efficiency rating levels.** In lieu of threshold levels for Chapter 8 in Table 303, rating levels for § 11.804.1 are in accordance with Table 11.804.2.

**Table 11.804.2**  
**Maximum WRI Scores for NGBS Certification in Chapter 8**

BRONZE	SILVER	GOLD	EMERALD
70	60	50	40

**11.804.3 Water efficiency NGBS points equivalency.** The additional points for use with Table 305.2.6.2 from the Chapter 8 Water Efficiency Category are determined in accordance with Equation 11.804.3.

**Equation 11.804.3**  
**NGBS = WRI x (-2.29) + 181.7**

*Following sections of Chapter 11 remain unchanged.*

PC278- APPENDIX D: WATER RATING INDEX

TYPE	DESCRIPTION	LOCATION	EFFICIENCY	PROJECT REF ID	STATE	UNITS	WRI Score	WRI Certification Level	WRI2 Score	WRI2 Certification Level	Prescriptive Points	Prescriptive Certification Level
Multifamily Reference 2	Small Building with Irrigated Area	Doral	High	1	FL	20	37	Emerald	43	Gold	95	Emerald
		Albuquerque	High	2	NM	20	31	Emerald	42	Gold	95	Emerald
		Doral	Mid	3	FL	20	54	Silver	59	Silver	77	Gold
		Albuquerque	Mid	4	NM	20	44	Gold	58	Silver	77	Gold
		Doral	Low	5	FL	20	75	None	74	None	50	Silver
		Albuquerque	Low	6	NM	20	60	Silver	72	None	50	Silver
Multifamily Reference 4	Large Building with Irrigated Area	Doral	High	7	FL	300	47	Gold	41	Gold	95	Emerald
		Albuquerque	High	8	NM	300	34	Emerald	42	Gold	95	Emerald
		Doral	Mid	9	FL	300	55	Silver	57	Silver	67	Gold
		Albuquerque	Mid	10	NM	300	49	Gold	57	Silver	67	Gold
		Doral	Low	11	FL	300	74	None	69	Bronze	50	Silver
		Albuquerque	Low	12	NM	300	63	Bronze	69	Bronze	50	Silver

