



Wildfire

HOME ASSESSMENT &

Checklist

What to know and what you can do to prepare.

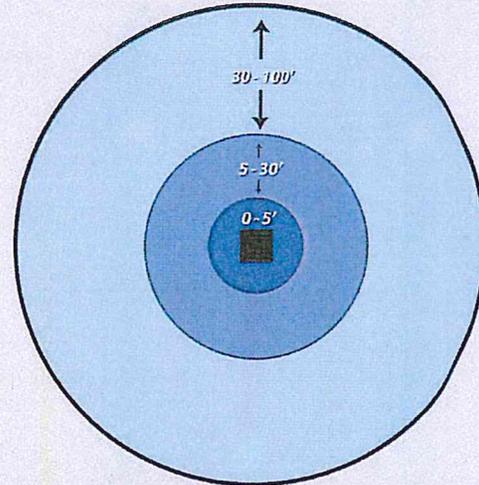
Wildfire Home and Property Checklist

Use the following checklist to help determine what parts of a home and the surrounding property may be most vulnerable during a wildfire. Reduce those risks with the guidance provided in the following pages.



PROPERTY

- Slope / Terrain
- Location of home on parcel
- Defensible space
 - 0-5'
 - 5-30'
 - 30-100'

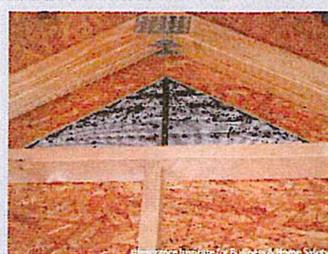


Know Your Space

Create defensible space to keep wildfire from getting too close to your property.

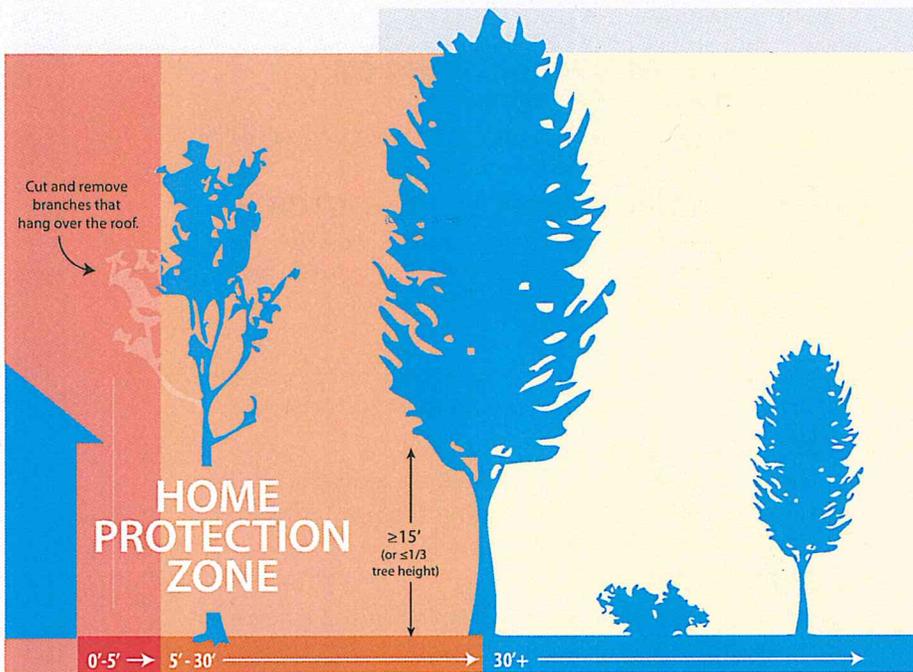
HOME

- | | |
|---|---|
| <ul style="list-style-type: none"> <input type="checkbox"/> Roof <ul style="list-style-type: none"> <input type="checkbox"/> Fire rating of covering <input type="checkbox"/> Shape <input type="checkbox"/> Edges <input type="checkbox"/> Skylights | <ul style="list-style-type: none"> <input type="checkbox"/> Exterior Wall <ul style="list-style-type: none"> <input type="checkbox"/> Type <input type="checkbox"/> Foundation type / clearance <input type="checkbox"/> Eave type
(under-eave construction) <input type="checkbox"/> Windows / Doors |
| <ul style="list-style-type: none"> <input type="checkbox"/> Vents and Other Openings <ul style="list-style-type: none"> <input type="checkbox"/> Face perpendicular to wind <input type="checkbox"/> Face parallel to wind <input type="checkbox"/> Ridge vents <input type="checkbox"/> Mesh screens | <ul style="list-style-type: none"> <input type="checkbox"/> Attachments <ul style="list-style-type: none"> <input type="checkbox"/> Deck <input type="checkbox"/> Enclosure <input type="checkbox"/> Garage <input type="checkbox"/> Fence |



Assessment:

WHAT TO KNOW TO BETTER PROTECT YOUR HOME FROM WILDFIRE



SLOPE

The slope of the land around your home is a major consideration in assessing wildfire risk. Wildfires burn up a slope faster and more intensely than along flat ground. A steeper slope will result in a faster moving fire, with longer flame lengths.

Homes located mid- or top of a slope (without set back) are generally more vulnerable because of increased flame length and intensity of a fire moving up the slope. Depending on the location of your home, defensible space may need to be increased.

ZONE 1

0-5 ft. around the perimeter

The objective of this zone is to reduce the chance of wind-blown embers from a nearby fire landing near the home, igniting combustible debris or materials and exposing the home to flames. This zone is closest to the house, so it requires the most careful selection and management of vegetation and other materials.

ZONE 2

5 ft.-30 ft. around the perimeter (or to the property line)

The objective of this zone is to create and maintain a landscape that, if ignited, will not readily transmit fire to the home. Trees and shrubs in this zone should be in well spaced groupings and well maintained. Ladder fuels (i.e., shorter vegetation or shrubs under taller trees) should be avoided to prevent the fire from climbing into the crown or upper portions of trees. If these groupings were to be ignited by wind-blown embers, the resulting fire should not be able to threaten the home by a radiant heat exposure or by flames being able to touch the exterior surfaces of your home.

ZONE 3

30 ft. - 100 ft. (or to the property line)

The objective of vegetation management in this zone is to reduce the energy and speed of the wildfire. Tree and brush spacing should force the fire in the tops of the tree, brush or shrub crowns to drop to the ground. Flame length should decrease.

Assessment:

WHAT TO KNOW TO BETTER PROTECT YOUR HOME FROM WILDFIRE

TREE BRANCHES OVERHANGING OR WITHIN 10 FT. OF THE ROOF

Branches overhanging your roof will result in more debris accumulation on your roof, in your gutters and near your home.

OTHER COMBUSTIBLE ITEMS/STRUCTURES

A fire in close proximity to a propane tank can result in gas releasing at the pressure relief valve, potentially resulting in a column of flame. Flames impinging on the upper surface of the tank can result in an explosion, particularly when the fuel level is low.

If ignited, other combustible items on your property, such as a tool storage shed or gazebo, could expose your home to radiant heat and flames.

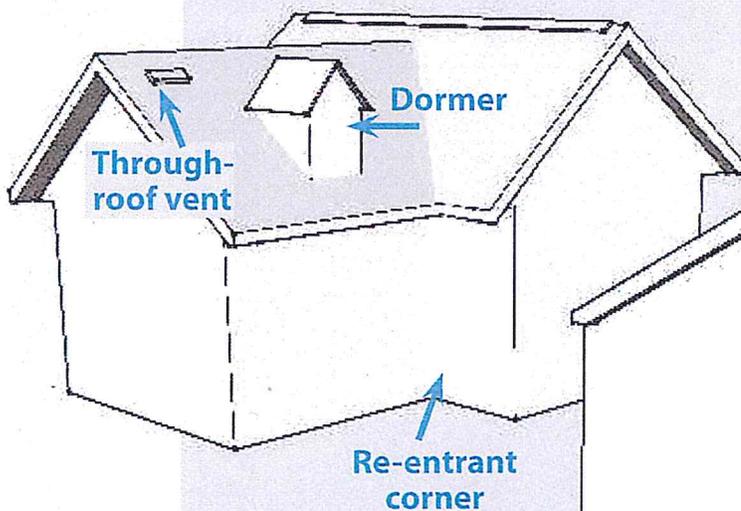
ROOF SLOPE

Roof slope is important because it will affect the amount of debris that accumulates and will also influence the radiant exposure to the roof if nearby vegetation or buildings ignite.

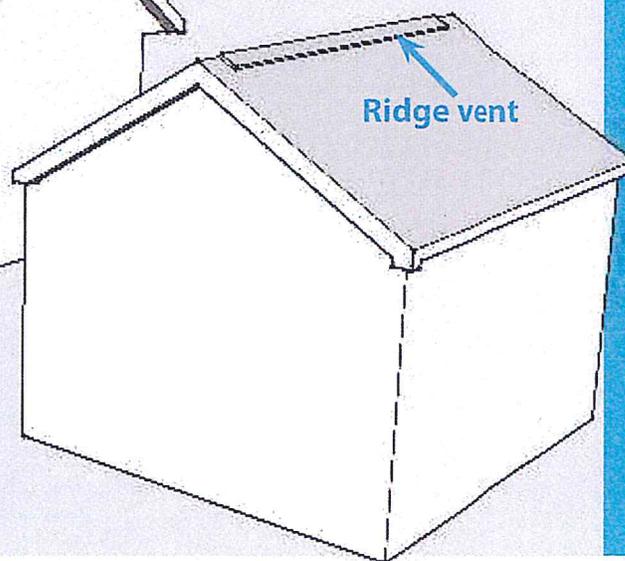
ROOF MATERIAL

Your roof is a large, relatively horizontal surface where debris from trees and other vegetation can accumulate. When a wildfire is threatening your home, wind-blown embers can also land on your roof and ignite this debris, potentially putting your home at risk. Your roof must be able to resist the burning embers from the wildfire and flames from ignited debris. Roof coverings are rated as Class A, B, or C. A Class A fire-rated roof covering offers the best protection.

COMPLEX ROOF



SIMPLE ROOF



Assessment:

WHAT TO KNOW TO BETTER PROTECT YOUR HOME FROM WILDFIRE

ROOF DESIGN

Even with a Class A roof, locations where the roof covering meets another material can be vulnerable. Debris can accumulate at these locations, and so can wind-blown embers. It is important to inspect these locations as they are potential “weak links” on your roof (for example, wood shingle siding on a dormer next to a Class A roof covering), or areas where the Class A roof can be by-passed (for example, non-bird stopped tiles at the roof edge).

SKYLIGHTS

During a wildfire, skylights could be an entry point for wind-blown embers and flames if the glass or Plexiglas opening were to fail. Operable skylights would also be vulnerable if left open when a wildfire threatens. Debris accumulation on top of and around skylights will be greater on flat or lower-sloped roofs. Dome-type skylights use an acrylic glass product and flat-type skylights use tempered or other specialized glass. Performance differences between acrylic and glass would make the flat-type skylights less vulnerable to wildfire exposures. All skylights incorporate metal flashing at the base, where it integrates with the roof.

VENTS

Most homes have enclosed spaces that are vented, including attics and crawl spaces. Other openings in an exterior wall include those for dryer vents and vents to supply make-up air for rooms where gas appliances are operating (e.g., furnace and/or water heater). Wind-blown embers that enter the attic or other enclosed spaces can ignite combustible materials that have either accumulated there or have been stored there.

Vents on vertical walls or surfaces have been shown to be vulnerable to the entry of embers. For the attic, these vents would include gable end vents, through-roof vents with a dormer face and under-eave vents used in open-eave construction. Crawl space vents (also called foundation vents), dryer vents and vents to supply make-up air would also be vulnerable to the entry of embers.

Some attic and foundation vents that have been specifically designed to resist the entry of embers and flames are commercially available. Your local fire or building department would know if any of these vents have been approved for use in your area.

Consider using closure devices. There are commercially available options or you can make your own and store in a place where they can be easily retrieved and installed when wildfire threatens. The commercial devices should be deactivated, or home-made covers removed, after the wildfire passes. Some gable end and crawl space vents have been designed to resist the entry of embers and flames - check with your local fire or building official to find out if any have been approved for use in your area.

EXTERIOR WALL - FOUNDATION

There are three basic types of foundations: concrete slab-on-grade, raised floor (i.e., one having a crawl space) and pier (or “post”) and beam (unless a perimeter skirting has been installed, this one will be open underneath). An “open underneath” foundation will be vulnerable if combustible materials or vegetation and debris has accumulated or has been stored there. Raised floor and slab-on-grade foundations can be vulnerable if the distance from

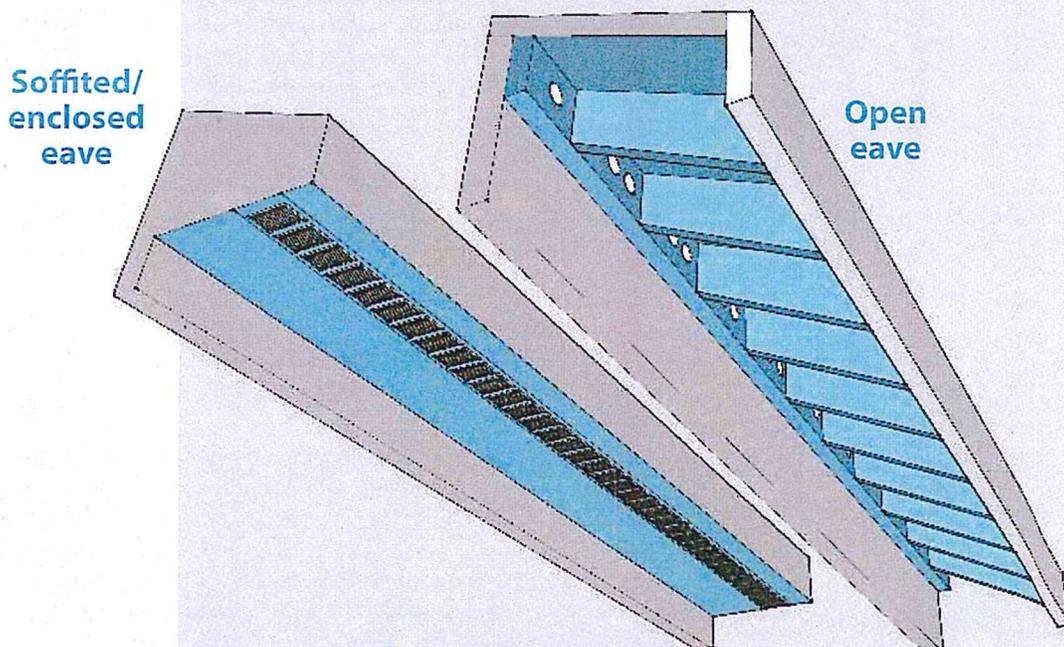
Assessment:

WHAT TO KNOW TO BETTER PROTECT YOUR HOME FROM WILDFIRE

the ground to the siding is much less than 6 in., or, in the case of a crawl space, ember entry occurs through a foundation vent. Combustible siding will be more vulnerable if the ground-to-siding clearance is less than 6-in. if embers can accumulate at the base of the wall. The use of combustible mulch and woody vegetation will make this area even more susceptible to ignition from wind-blown embers. Untreated wood shingle and vinyl siding are relatively more vulnerable to flame contact and radiant heat exposures that would result from an ember ignition of near-home debris or other combustible items.

UNDER-EAVE CONSTRUCTION

Under-eave construction consists of either "open-eave framing" or is enclosed with a "soffit" material (also called "boxing-in"). Vent openings are often found in this area. Vents in open-eave construction can be vulnerable to the entry of embers, and are more vulnerable to ember entry than vents located in a soffit-ed eave. Open-eave construction can also trap heat if subjected to flames, resulting in more rapid ignition of combustible construction materials and lateral flame spread. Flames reaching the under-eave area would be more likely if combustible vegetation and mulch were included in the 0-5 ft. "near-home" zone and similarly, if combustible siding were used.



EXTERIOR WALL - MATERIAL

Siding is vulnerable when it ignites and flames or embers get into the cavity behind it or if the flames spread vertically, impinging on windows and the eave. With inadequate ground-to-siding clearance, accumulated embers can ignite combustible siding directly. Ignition is more likely if combustible siding is exposed to a direct flame contact or extended radiant heat exposure. The chance of direct flame contact is greater if you haven't created

Assessment:

WHAT TO KNOW TO BETTER PROTECT YOUR HOME FROM WILDFIRE

and maintained a 0-5 ft. noncombustible zone around your home. An extended radiant heat exposure is possible if nearby combustible materials (for example, a firewood pile) or a nearby building ignite. Untreated wood shingle and vinyl siding are relatively more vulnerable to flame contact and radiant heat exposures.

RE-ENTRANT (INTERIOR) CORNER

An interior corner that is constructed using combustible siding and trim will be more vulnerable to flames. If ignited, flames will spread vertically more quickly.

WALL VENTS AND OPENINGS

Vents located on a vertical wall, including crawl space vents (also called foundation vents), gable end vents, and other openings such as a dryer vent, will be very vulnerable to the entry of wind-blown embers.

WINDOWS

An open window is the most vulnerable window when a wildfire threatens - embers can easily enter the home. Closed windows are vulnerable to radiant heat and direct flame contact exposures. If the frame ignites or melts, the fire may burn into the stud cavity and into the living space of the home. If glass breaks, embers and flame can easily enter the home. Of these, the glass is the most vulnerable component.

GARAGE (ATTACHED OR DETACHED)

Most people store combustible materials in their garage. Garage (vehicle access) doors, particularly on older garages, can have small gaps at the top, sides and bottom that can allow embers to enter. These embers can ignite combustible materials stored in the garage.

DECK

Your decks is a vulnerable part of your home when it ignites. A burning

deck will expose the building to radiant heat and flames, potentially igniting combustible siding and breaking glass in windows and doors. The materials used to build the deck, combustible materials you store under your deck, vegetation around it and the location of your deck relative to the slope around your house all contribute to how vulnerable your deck will be. Debris that accumulates between deck boards and at deck-to-wall intersections can be ignited by embers. Rotted wood deck boards and structural support members are more easily ignited when they are dry.



©Insurance Institute for Business & Home Safety

Checklist:

MITIGATION ACTIONS OR RETROFIT OPTIONS

- S** < \$500
- \$\$** \$500 - \$1,000
- \$\$\$** \$1,000 - \$5,000
- \$\$\$\$** >\$5,000

SLOPE

Is your home located in the middle of a steep slope or at the top of a slope with minimal setback?

- If yes, increase vegetation management in the 5 ft. to 100 ft. zones. Consider installing a noncombustible wall within 15-20 ft. of the down slope side of your home, particularly if you have a deck overhanging the slope.

YOUR DEFENSIBLE SPACE IS COMPRISED OF THESE THREE ZONES. THE SELECTION AND MAINTENANCE OF VEGETATION AND OTHER COMBUSTIBLE ITEMS IN THESE ZONES WILL DETERMINE HOW ADEQUATE YOUR DEFENSIBLE SPACE IS.

ZONE 1

0-5 ft. around the perimeter of the home

- Install hard surfaces in this zone, such as a concrete walkway, or use noncombustible mulch products, such as rock. Keep the lawn well irrigated and use low-growing herbaceous (non-woody) plants. Shrubs and trees are not recommended in this zone. Remove dead vegetation and implement a maintenance strategy to keep the area clear of dead plant materials. **\$-\$**

ZONE 2

5 ft.–30 ft. around the perimeter (or to the property line)

- Create islands or groupings of vegetation to form a discontinuous path of vegetation to make it difficult for the fire to burn directly to your home. Remove dead plant material and tree branches. Remove lower tree branches and shrubs positioned under the tree line so that a surface fire cannot reach the tree crown. Trees located within this zone should be maintained with a minimum horizontal spacing of 10 ft. between crowns, with the distance increasing with slope. Prune limbs and branches to a height of up to 15 ft. For shorter trees, pruning should not exceed one-third of the

tree height. Relocate propane tanks larger than 125 gallons (water capacity) at least 30 ft. from your house. Create 10 ft. of Zone 1 defensible space around the tank. Consider surrounding three sides with a noncombustible wall to help protect it. **Free - \$\$\$**

ZONE 3

30 ft. - 100 ft. (or to the property line)

- Trees located in this zone should be maintained with a minimum horizontal spacing of 10 ft. between crowns, with this distance increasing with slope. Ladder fuels under taller trees should be eliminated. Separation between groupings of shrubs and bushes should be created and maintained. Remove dead plant material from all vegetation. Vegetation management beyond 100 ft. should be considered if the home is located on a steep slope. **Free - \$\$\$**

Does your home have a tool shed, detached garage, play set or other structures in the yard?

- Create defensible space around secondary buildings or relocate them at least 30 ft. from your home. Consider a noncombustible material for a trellis. Carefully maintain vegetation used on trellis-type structures, pruning regularly to remove dead vegetation. Combustible materials used for play sets are typically larger dimensions (and therefore more difficult to ignite). Combustible wood/bark or rubber mulch that are more commonly used as surfacing materials around play sets are easily ignited by embers. Play sets with combustible mulch surfacing materials should be relocated at least 30 ft. from your home. **Free - \$\$**

ROOF COVERING

Do you have a Class A fire-rated roof?

- If not, choose a product rated Class A when it's time to re-roof. Non-rated products include untreated wood shakes or shingles. Other roof coverings may carry a Class B or C fire rating. A Class A fire-rated roofing product offers the best protection. **\$\$\$\$**

Checklist:

MITIGATION ACTIONS OR RETROFIT OPTIONS

- \$** < \$500
- \$\$** \$500 - \$1,000
- \$\$\$** \$1,000 - \$5,000
- \$\$\$\$** > \$5,000

ROOF EDGE(S)

Are your gutters full of debris?

- If yes and you have a *SIMPLE ROOF DESIGN*, clean out gutters and install a drip edge at the roof edge to protect any exposed roof sheathing or fascia. **Free - \$\$**
- If yes and you have a *COMPLEX ROOF*, clean out gutters and install a drip edge at the roof edge to protect any exposed roof sheathing or fascia. Remove any debris that has accumulated at roof-to-wall intersections, for example, near a dormer or a chimney. For added protection, consider replacing combustible siding at any "intersection" location with a noncombustible or ignition resistant siding product. Metal step flashing extending up from the roof a minimum of 6 in. can be installed at the base of combustible siding in lieu of replacing it (integrate with siding to avoid moisture-related degradation problems). If necessary, consult a roofing professional to get help with this. If windows are present, replace with ones that have dual / multi-pane, tempered glass. **Free - \$\$\$**

Do gaps or openings exist between the roof covering and the roof deck? These gaps are common with clay barrel-style roofs and some types of metal and cement (flat) tile roof coverings. The gaps can occur at the roof eave or ridge.

- If yes, fill the space with either a commercially available "bird stop" material or plug with a mortar mix (the material used between layers of bricks). This material will minimize the accumulation of debris than can accumulate between the roof covering and the roof sheathing, and will also limit the intrusion of embers when a wildfire threatens your home. **\$-\$\$**

VENTS ON YOUR ROOF

Are the attic vents located on your roof covered with screening that is free of debris?

- If there is no screening, install 1/8 in. metal mesh screening. **\$-\$\$**
- If you have a turbine vent, enter the attic and inspect the location where the vent attaches to the roof. Attach 1/8 in. screening to the roof sheathing if none is present. **\$-\$\$**

- If you have dormer-face vents, replace them with a low-profile vent. **\$-\$\$**
- If you have ridge vents, they should be rated for high-wind / rain exposure, and specifically should be a Florida Building Code High Velocity Hurricane Zone approved ridge vent, regardless of where you are in the country. **\$-\$\$**
- Consult your local fire or building department to find out if any vents designed to resist the entry of embers and flames have been approved for use in your area. **Free**

SKYLIGHTS

Are skylights installed on a flat or low-sloped roof?

- Remove accumulated debris next to and on the skylight. **Free**

Do you have a dome-type skylight?

- If yes, consider replacing it with a flat, tempered glass skylight. If the skylight is installed on a steep roof and if vegetation is at the same level, remove and prune vegetation, clear away debris, and trim overhanging limbs. **Free - \$\$**
- Keep operable skylights closed when a wildfire threatens. **Free**

FOUNDATIONS

Do you have a post-and-beam style foundation?

- If yes, enclose it with a noncombustible material—this process is sometimes called "skirting". Ventilate enclosed space according to your building code requirements. All foundation vents should have 1/8 in. corrosion-resistant metal screening that is in good condition. **\$-\$\$\$**
- Remove combustible materials stored in the crawl space, or from under the building if you have a non-skirted post-and-beam foundation. **Free**

Checklist:

MITIGATION ACTIONS OR RETROFIT OPTIONS

- \$ < \$500
- \$\$ \$500 - \$1,000
- \$\$\$ \$1,000 - \$5,000
- \$\$\$\$ > \$5,000

VENTS ON THE EXTERIOR WALLS

Do you have foundation vents that are closeable?

- Some foundation vents are closeable - these vents should be closed when a wildfire threatens, but should be opened after the wildfire has passed. Some foundation vents have been designed to resist the entry of embers and flames - check with your local fire or building official to find out if any have been approved for use in your area. Remove combustible materials stored in the crawl space.

Free

Do you have vent covers for foundation and/or gable end vents?

- If not, consider using closure devices. There are commercially available options or you can make your own and store in a place where they can be easily retrieved and installed when wildfire threatens. The commercial devices should be deactivated, or home-made covers removed, after the wildfire passes. Some gable end and crawl space vents have been designed to resist the entry of embers and flames—check with your local fire or building official to find out if any have been approved for use in your area. \$\$

Do you have other vent openings on the wall?

- Dryer vents and wall-mounted make-up air openings for furnaces should be screened with 1/8 in. corrosion resistant metal mesh. Consider installing a louver-type dryer vent that is closed unless the dryer is running. \$

SIDING

Do you have combustible siding?

- If yes, create a 0-5 ft. defensible space zone next your home. Remove any accumulated debris as necessary. If siding extends to grade, consult with contractor to determine if your foundation would allow some siding at the base of the wall to be removed to obtain the 6 in. clearance. Moisture-related degradation and insect damage may be present in some siding products that have been installed such that it extends to grade.

Free - \$\$

- Examine your siding for locations where embers could accumulate or lodge. Apply caulk at trim-to-siding locations where it is missing or has failed (\$). \$ - \$\$
- If you plan to re-side your house, use a noncombustible or ignition resistant material for the siding and corner trim. If you haven't already done so, create a 0-5 ft. noncombustible zone in this area. \$\$\$\$

EAVES

Do you have open-eave framing?

- If yes, consider converting open-eave framing to a boxed-in or soffit-eave design. Venting in the soffit material (and between the soffit and attic space) must be maintained. If you haven't already done so, create a 0-5 ft. noncombustible zone next your home. \$\$\$

Do you have vents in the eaves?

- If yes, all vents should be covered with 1/8 in. mesh corrosion-resistant metal screening. If an open-eave construction is maintained: Closure devices for vents located in the blocking of open-eave framing are commercially available. Consider purchasing these or making them from 1/4-in. plywood or thin sheet metal. Install these devices when a wildfire threatens and remove or open them after the threat has passed. Under-eave vents have been designed to resist the entry of embers and flames—check with your local fire or building official to find out if any have been approved for use in your area. \$-\$\$\$

Checklist:

MITIGATION ACTIONS OR RETROFIT OPTIONS

- \$** < \$500
- \$\$** \$500 - \$1,000
- \$\$\$** \$1,000 - \$5,000
- \$\$\$\$** > \$5,000

WINDOWS

Do you have single-pane windows?

- If yes, replace single-pane windows with dual or multi-pane windows, preferably ones with tempered glass. **\$\$\$ - \$\$\$\$**
- Install window screening to improve performance against radiant heat exposures and to minimize the size and number of embers that could enter the home. Both plastic-clad fiberglass and metal screening will reduce radiant exposure to the glass and protect against ember entry but neither will protect against flames. The fiberglass screen will fail if exposed to flames, thereby allowing embers to enter if the window glass has also failed. If you haven't already done so, create a 0-5 ft. noncombustible zone near your home. **\$-\$\$**

GARAGE (DETACHED OR ATTACHED)

Do you have a garage door?

- If yes, weather seal the perimeter of garage doors. **\$**
- If you do not have a garage door, consider installing one to help protect combustible materials stored there. **\$\$**

DECK

Do you have a deck?

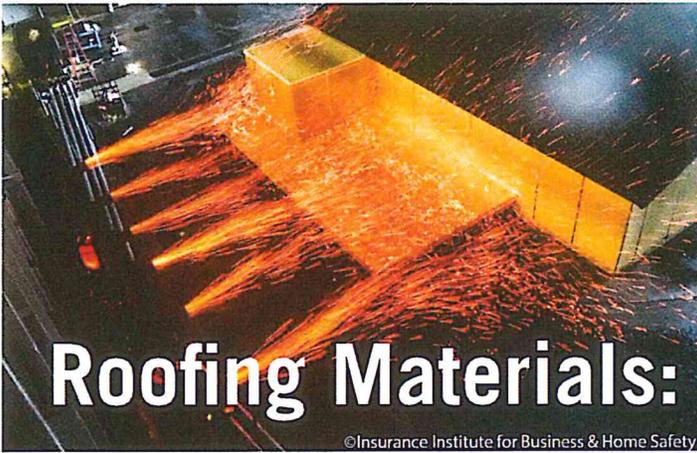
- If your deck overhangs a steep slope, be sure your defensible space is sufficient to minimize flames spreading up the hill and reduce flame length to minimize the chance for a flame contact exposure to the underside of the deck. Consider building a noncombustible wall across the slope approximately 15–20 feet from the edge of the deck. **Free - \$\$\$**
- Do not store combustible materials under your deck. If you have no other option, installing a noncombustible siding product around the deck perimeter may be an option. Be sure the enclosed space is adequately ventilated to minimize the chance of water-related damage (i.e., fungal decay, fastener corrosion, etc.). **Free - \$\$\$**

- Most deck boards are combustible, including wood, plastic and wood-plastic composites. Solid surface decks, such as those made from lightweight concrete, are usually noncombustible, but are also more expensive. If you live in a wildfire-prone area anywhere in the country, when it's time to replace deck boards, choose a product that complies with the requirements of the California Building Code, as provided in the Office of the State Fire Marshal Wildland Urban Interface (WUI) Handbook (http://osfm.fire.ca.gov/strucfireengineer/strucfireengineer_bml.php). **\$\$\$**
- Regularly clean out debris from between deck board joints and other areas where debris has accumulated. Check the condition of wood deck boards and structural support members—replace or repair rotted members. **Free**
- When a wildfire threatens, move combustible deck furniture and cushions inside or move as far away from the house as possible. Treat other combustible items, such as a broom, as your furniture and move them inside or far away from the house. Any LP tank for a grill should be moved off the deck and away from the home. **Free**

FENCE

Do you have a fence?

- Replace any combustible fencing that attaches directly to your home with a noncombustible section that is at least 5 ft. long. A chain link gate or fence, a wood frame fence with metal mesh infill, or other noncombustible material can be used. If metal wire is used, do not allow climbing vegetation to grow on the fence—this would defeat the purpose of the noncombustible material. **\$-\$\$**

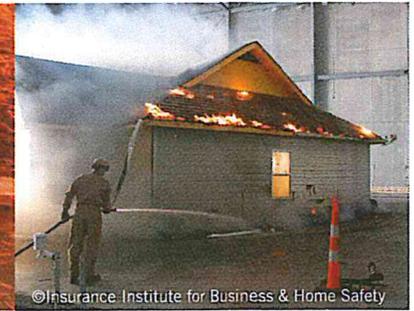


Roofing Materials:

©Insurance Institute for Business & Home Safety



©Insurance Institute for Business & Home Safety



©Insurance Institute for Business & Home Safety

Roofs are a highly vulnerable part of a home during wildfires

HOMEOWNERS NEED TO IMPLEMENT RISK REDUCTION ACTIONS THAT MAKE HOMES BETTER ABLE TO SURVIVE A WILDFIRE - AND THE ROOF IS A GREAT PLACE TO BEGIN!

HOW HOMES IGNITE

Homes ignite in one of three ways: embers/firebrands, radiant heat exposure or direct flame contact. An example of an ember ignition is when wind-blown embers accumulate on combustible materials such as a wood shake roof. An untreated wood shake or shingle roof covering is the greatest threat to a home.

ROOF COVERINGS AND ASSEMBLIES

Roof covering fire ratings are Class A, B, C, or unrated; with Class A providing the best performance. Common Class A roof coverings include asphalt fiberglass composition shingles, concrete and flat/barrel-shaped tiles. Some materials have a “by assembly” Class A fire rating which means, additional materials must be used between the roof covering and sheathing to attain that rating. Examples of roof coverings with a “by assembly” fire rating include aluminum, recycled plastic and rubber and some fire-retardant wood shake products. If a wood shake roof does not have the manufacturer’s documentation specifying the fire retardant, assume it’s untreated.

TILE AND ROOF COVERINGS WITH GAPS BETWEEN THE COVERING AND ROOF DECK

Flat and barrel-shaped tiles, metal, and cement roof coverings can have gaps between the roof covering and sheathing, which typically occur at the ridge and edge of roofs. These openings can allow birds and rodents to build nests with materials that are easily ignited by embers. Flames from this type of ignited debris can spread to the structural support members, bypassing the protection offered by a Class A rated roof covering. Plugging these openings between the roof covering and the roof deck, is commonly called “bird stopping”. Regularly inspect and maintain these areas.

DEBRIS ACCUMULATION – ROOF AND GUTTERS

Wind-blown debris (including leaves and pine needles from nearby and overhanging trees) will accumulate on roofs and in gutters. Dry debris can be ignited by wind-blown embers. These flames can extend to the edge of the roof and adjacent siding. Even with Class A fire-rated roof coverings, vertical surfaces next to the roof edge will be exposed to flames from the ignited debris. Regularly remove vegetative debris from your roof and gutters.

ATTICS, CRAWLSPACES, SOFFITS AND EAVES

Post-fire research has shown attic vents, roof and gable end vents and under-eave areas are entry points for embers and flames. Reduce the size and number of embers that pass through vents into attic and crawlspaces by covering them with a 1/8-inch metal mesh screen. When wildfires threaten, vents can be covered with 1/2-inch or thinner plywood, or a thin metal plate. Ensure these are removed when the threat has passed.

REDUCE YOUR ROOF’S VULNERABILITY TO WILDFIRE

1 Roofs should be Class A fire-rated, such as asphalt composition shingles. If you’re unsure about your roof’s rating, hire a professional roofer to make a determination.

2 Remove debris on the roof and in the gutters at least twice a year, or more often if necessary.

3 Remove tree branches that overhang the roof.

4 Periodically inspect exposed areas under eaves and soffits to ensure construction materials are in good condition.

5 Cover vents, e.g., with noncombustible, corrosion-resistant 1/8-inch metal mesh screens.

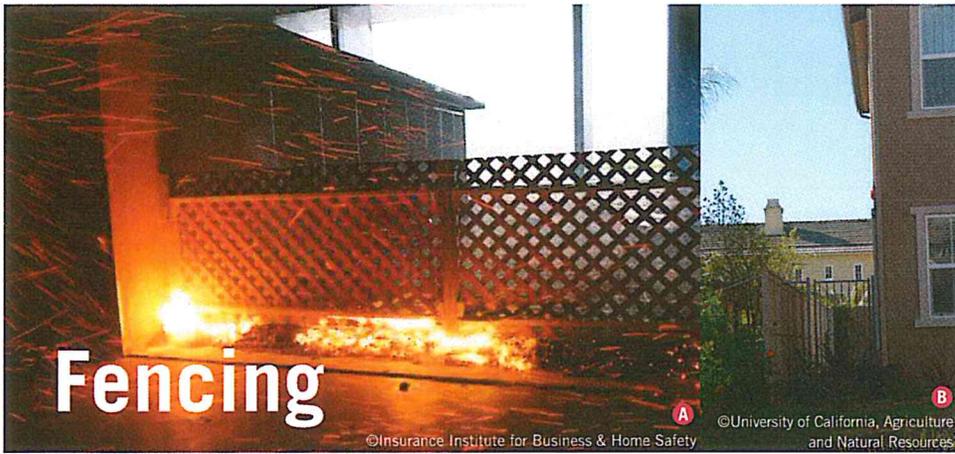
6 Inspect and maintain your roof on a regular basis. Replace when necessary.



©Insurance Institute for Business & Home Safety



FIREWISE USA™
RESIDENTS REDUCING WILDFIRE RISKS



Fencing

©Insurance Institute for Business & Home Safety

©University of California, Agriculture and Natural Resources

©Insurance Institute for Business & Home Safety

RESEARCH FINDINGS:

1 Use a noncombustible fence section when it's attached to a building.

2 The area at the base of the fence should be kept clear of debris. Flame spread to the building will be more likely if fine vegetative fuels (e.g., pine needles, leaf litter and small twigs) have accumulated. Avoid placement of combustible mulch near the fence.

3 A fence design that allows for greater air flow, such as a single panel lattice fence, makes it more difficult for wind-blown embers to accumulate at plank, or lattice panel to horizontal support locations. If an ignition occurs, it's also more difficult for lateral flame spread to occur in the fencing material. Fence ignitions from wind-blown embers are more likely to occur at locations where vertical fencing planks attach to horizontal support members. The most vulnerable fencing from this perspective is a "privacy" fence, where the fence planks are on the same side as the horizontal support members.

4 A fence built from lattice that's applied to both sides of the support posts may be desired for privacy or other landscaping purposes, but should be avoided in wildfire-prone areas. Recent research at NIST has demonstrated that fire growth and lateral flame spread are much greater in this design style.

5 Vinyl fencing is not vulnerable to ember exposures alone, but did burn when subjected to flaming exposures from burning debris. Vinyl fencing will deform if subjected to radiant heat.

Material, Installation and Maintenance Choices

NONCOMBUSTIBLE FENCING PRODUCTS REDUCE POTENTIAL HOME IGNITIONS

Many wildfire educational programs, along with the Insurance Institute for Business & Home Safety (IBHS) recommend noncombustible fencing products when placed within five feet of a building. As a necessary component, fencing located within the zero to five-foot noncombustible zone should be constructed of noncombustible materials.

A noncombustible zone minimizes the likelihood of wind-blown embers igniting fine fuels (such as bark mulch) located close to the building. Ember-ignited mulch can result in a radiant heat and/or flaming exposure to the building's exterior. Using noncombustible fencing where it attaches to the building reduces the opportunity of a burning fence igniting the exterior of the structure. Fencing products are often available in eight-foot pieces and use of that full section of noncombustible material is recommended. Observations made during the 2012 Waldo Canyon fire in Colorado Springs, CO provided evidence that burning fencing generates embers that can result in additional ignitions down-wind.

PERIMETER FENCING

When neighboring buildings are located within 20 feet of each other, use of steel fencing for the perimeter area can serve as a radiant barrier, providing added protection should a neighboring building ignite and burn. Research in Australia demonstrated the ability of panelized steel fencing to resist a radiant heat exposure.

RESEARCH FINDINGS TO HELP AVOID FENCE IGNITIONS

Recent research conducted by IBHS and the National Institute of Standards and Technology (NIST), both independently and in a collaborative project, provided additional information about the vulnerability of combustible fencing.

Photo Captions:

- A** Flame spread to the building when combustible debris was at the base of the fence.
- B** Gates made from noncombustible materials should be used where a fence is attached to the home. Source: University of California, Agriculture and Natural Resources
- C** Ignition from ember accumulation at the intersection of the vertical planks and horizontal support member.



FIREWISE USA™
RESIDENTS REDUCING WILDFIRE RISKS

Fire Spread on Ember-Ignited Decks

Wind-blown embers generated during wildfires are the single biggest hazard wildfires pose to homes, and homeowners should never overlook the potential risk that an attached deck can create. Recent testing by the Insurance Institute for Business & Home Safety (IBHS) offers important findings that can help minimize risk from wind-blown embers to decks.

Nothing that can ignite should be stored under a deck. This action, along with development of effective and well-maintained home ignition zones, will minimize the chance of all but a wind-blown ember exposure to your deck. An ignited deck can result, for example, in the ignition of combustible siding, or glass breakage in a sliding glass door.

ABOUT THE RESEARCH TESTS

IBHS's tests evaluated how an ember-ignited fire on an attached deck can spread to the home, and yielded important guidance to minimize the chance of fire spread to the house. Tests showed that the fire was typically small (Figure 1), sometimes just smoldering (not flaming). It spread slowly, taking more than an hour to travel the 4 to 6 feet from the ignition point to the home. Research from IBHS showed all ember-ignited deck fires occurred in the gaps between deck boards and initially started as a small smoldering fire that transitioned to a flaming fire. Although these small fires self-extinguished during IBHS tests that did not include any wind, wildfires almost always involve elevated wind speeds. During lab tests, even mild wind speeds of 12 mph, enabled fires to spread. Under certain conditions, the small fire did grow, always in the under-deck area (see Figure 2). Our results demonstrated that fire growth occurred in the under-deck area when joist spacing was 8" to 12", less than the typical 16".

Wind blowing against a building has a return flow component, so if fire were able to burn to the home, it would have to travel there as a backing fire, or against the wind. Research shows the "fuel" has to be close together for this to occur. That "fuel" could be the deck boards, or a combination of deck boards and support joists.

HOW DOES THE FIRE SPREAD?

IBHS tests demonstrated that fire spreads both toward, and away from, the house

regardless of the deck board's orientation (parallel or perpendicular). When deck boards were perpendicular to the building, the fire would spread in the gap between boards. The 1/8" gap between deck boards was narrow enough for the fire to continue burning into the unburned wood (the fuel), in both directions from the ignition point. The fire spread pattern was more complicated when deck boards were parallel to the test building. In this case, fire could spread parallel to the test building, or directly to it. Fire spread directly to the building included a smoldering mode that occurred in the space between the top of the joist and the bottom of the deck board. Flaming combustion occurred when smoldering reached a gap between deck boards. Lateral flame spread can result in the ignition of joist members, resulting in fire growth.

IMPORTANCE of the HOME IGNITION ZONES

To minimize the possibility of deck ignitions, reduce fuels in the home ignition zones by carefully selecting and positioning vegetation and implementing regular maintenance. Pay particular attention to the area under the footprint of the deck, where storage of combustible materials should be avoided.

Although there are noncombustible deck board and decking options, many of the commercially available deck board products are combustible. IBHS research on deck materials is available at: disastersafety.org/ibhs/wildfire-ignition-potential-decks-subjected-ember-exposure.

CONSTRUCTION RECOMMENDATIONS

IBHS research shows that, for medium density softwood decking products (such as redwood and cedar), which can be vulnerable to ignition from embers, the associated fire spread on the deck can be minimized by the following:

1. Increase the gap between deck boards from 1/8 inch to 1/4 inch.

Fire spread in the gap between deck boards. Note the small flame burned all the way to the test building.



2. Increase joist spacing from 16 inches to 24 inches.



Narrow joist spacing was a condition that could result in fire growth in the under-deck area.

3. Apply a foil-faced self-adhering adhesive flashing tape (foil-faced bitumen tape) on the top of each joist.

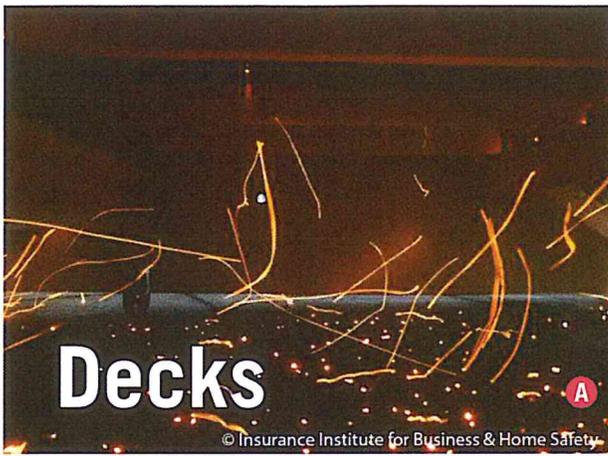
Using a foil-faced self-adhering bitumen flashing tape reduces flame spread by removing the joist as a fuel source for both parallel and perpendicular deck board installations.



FOIL-FACED BITUMEN TAPE



FIREWISE USA®
RESIDENTS REDUCING WILDFIRE RISKS



Decks

© Insurance Institute for Business & Home Safety

© Insurance Institute for Business & Home Safety

B

C

Reduce the Vulnerability of Your Deck to Wildfire

MANY HOMES LOCATED IN WILDFIRE-PRONE AREAS HAVE ATTACHED DECKS, WHICH CAN POTENTIALLY SPREAD FIRE TO THE HOUSE WHEN IGNITED DURING A WILDFIRE.

A burning deck can ignite siding or break the glass in doors or windows, allowing fire to gain entry into the house. Consequently, making decks less vulnerable to wildfire also makes your house less vulnerable. Reducing the deck's vulnerability requires an approach that focuses on the materials and design features used to build the deck, and creating a noncombustible zone around and under the deck.

EMBER EXPOSURE AND IGNITION

Walking surfaces of decks are either solid surface or constructed using deck boards (with between board gaps). Solid surface decks are commonly light weight concrete or tile. Combustible deck board types include: solid wood and wood-plastic composites (these products are more widely used than noncombustible deck boards). Noncombustible deck board types include: metal and fiber cement.

Recent testing at the IBHS Research Center showed embers mostly lodge between deck board gaps and where deck boards rest on joists. Embers can accumulate and potentially ignite decking and combustible joists. Embers can also fall through board gaps and land on materials stored beneath the deck. It's critical to remove all combustible materials from the under-deck area to minimize the opportunity for ignitions; where resulting flames would impinge on the decking (some wood-plastic decking products are vulnerable to flaming exposures).

IBHS tests also showed that even without vegetative debris in between deck gaps, medium density softwood decking products, such as redwood or western redcedar are vulnerable to ember ignitions. Most wood-plastic composites, along with higher density tropical hardwood, and fire-retardant treated decking products are less vulnerable to embers. The vulnerability to embers in these locations is a reminder to remove debris that accumulates in these areas.

BUILDING CODE REQUIREMENTS

The International Wildland Urban Interface Building Code (IWUIC) and the California Building Code are the most commonly referenced construction codes for wildfire-prone areas; both include requirements that focus on the walking surfaces of decks. Noncombustible products are allowed by both codes.

The California Code provides provisions for accepting combustible decking products. These types of products are more commonly used by homeowners living in wildfire-prone areas across the country. Their requirement governs the amount of heat released when

combustible decking is ignited by a gas burner. This mimics burning debris that could be located under the deck, or burning vegetation impinging on the underside of the deck, but does not mimic ember exposure. Combustible decking products that comply with the California Code can be found at: http://osfm.fire.ca.gov/licensinglistings/licenselisting_bml_searchcotest.

The IWUIC prohibits common combustible deck boards with the exception of fire-retardant treated decking (rated for outdoor exposure) and other materials

- Photo Captions:**
- A** Embers that pass through deck board gaps will land on the ground, or on combustible materials stored under the deck, as shown during this IBHS test.
 - B** The near home noncombustible zone that surrounds the foundation should include a noncombustible area underneath the deck.
 - C** Vegetative debris in between deck board gaps will make this location even more vulnerable to ember accumulation.

RECOMMENDATIONS FOR YOUR DECK:

- 1** Combustible materials should not be stored beneath decks. This will effectively create a noncombustible zone under the entire footprint of the deck.
- 2** Routinely remove debris that accumulates in between deck board gaps and debris that can accumulate at the intersection between the deck and house.
- 3** If the deck is a non-fire-retardant treated softwood deck, consider removing and replacing deck boards within a few feet of the house. Be careful to match the deck board thickness.
- 4** When building new decks, select deck boards that comply with the California Building Code requirements. If using wood joists, cover the top and part of the sides with a foil-faced bitumen tape product.

that meet the requirements of an Ignition Resistant Material. However, as of this date, no other materials meet these requirements. The IWUIC allows an enclosed deck option that uses a horizontal construction attached to the bottom of the deck joists. This option should only be used with a solid surface deck. Using this option with deck boards (and the associated gaps), will cause moisture-related degradation problems (corrosion of fasteners and wood rot). Water from rain or melting snow will easily get into the enclosed space and will have a much harder time getting out.



FIREWISE USA™
RESIDENTS REDUCING WILDFIRE RISKS

Coatings

©Insurance Institute for Business & Home Safety

Product types, application requirements and performance limitations

Buildings threatened by wildfire can be mitigated through the development of a strategy that addresses the built environment, vegetation, and other combustible materials on the property. Use of noncombustible materials and ember-resistant design features are examples of strategies that reduce the vulnerability of homes to wildfire. The use of coatings has been suggested as a strategy to provide enhanced protection against extended radiant heat and flame contact exposures for homes located in wildfire-prone areas, particularly when a combustible siding product is installed and other homes are nearby. In these cases, it can be argued that applying a coating is a less expensive option than replacing a combustible product with one that is noncombustible.

Photo Captions:

- A** Gel product applied to wood siding.
- B** Using a wet-film gauge to ensure the film thickness is adequate.

INTUMESCENT PAINTS

A common example of a coating providing enhanced performance when exposed to fire is intumescent paints (i.e., they form a film when dry). When an intumescent coating is heated by elevated levels of radiant heat, or flames, it can swell up to 20 times the original dry-film thickness; creating an insulation layer that protects the combustible building component.

Intumescent coatings are commonly used in interior applications. However, caution is advised - when these products are used in an exterior application. Researchers at the USDA Forest Service Forest Products Laboratory reported that fire-retardant coatings have an uncertain "shelf life" when used in an exterior location and would therefore need to be reapplied regularly.

If an intumescent coating is being considered, ensure the manufacturer has provided test results demonstrating enhanced performance, either after a defined accelerated weathering period or an extended natural weathering period. Acknowledging their uncertain performance when used in exterior applications, the use of coatings is not allowed for compliance with provisions of the California Building Code, Chapter 7A, which provides requirements for building in wildfire-prone areas in California.

COMMON USE OF COATINGS

The term "coatings" is a generic term referring to products that are applied to various building components. These building components can be combustible or noncombustible materials and are used to provide added protection from various environmental factors. The most common use for coatings applied on wood, and wood-based products, is to provide protection from water or water vapor where the coating reduces the rate that moisture enters and leaves. Depending on additives and the chemical makeup, coatings can also improve the fire retardancy or fire resistance of the wood or other combustible material.

GELS

Another example of a coating is what's commonly referred to as a "gel." Gels are water absorbent polymers that can be applied to a building component to provide temporary protection from radiant heat or flames. You may have heard of these products being applied to homes when a wildfire is threatening. Once applied, the absorbed water starts to evaporate, whether or not the wildfire actually arrives, and therefore the time that a gel coating is effective is limited. The effective time is on the order of hours.

RECOMMENDATIONS

Given the current performance limitations of coatings, we recommend other proven mitigation strategies to reduce the vulnerabilities of homes to wildfire, such as using ember-resistant design features and creating and maintaining the home ignition zones. For more information visit: disastersafety.org/wildfire



FIREWISE USA™
RESIDENTS REDUCING WILDFIRE RISKS



Attic and Crawl Space Vents

©Insurance Institute for Business & Home Safety

©Insurance Institute for Business & Home Safety

©Insurance Institute for Business & Home Safety

Windblown embers can enter attics and crawl spaces through vents.

INSTALLING THE RECOMMENDED MESH SCREENING AND ELIMINATING STORAGE IS CRITICAL TO REDUCING BUILDING IGNITIONS DURING A WILDFIRE.

VENTS IN ATTICS AND CRAWL SPACES

Attic and crawl space vents, and other openings on the vertical wall of a home, serve important functions, including providing ventilation to remove unwanted moisture from these typically unoccupied spaces and oxygen for gas appliances such as hot water heaters and furnaces. Wind-blown embers are the principal cause of building ignition and can readily enter these spaces, which are often hot and dry. Providing air for ventilation, while also keeping out embers can present a dilemma. Dry materials are more easily ignited by embers, so limiting the entry of embers into attic spaces is critical. Adding to the problem are the combustible materials we tend to store in these spaces (e.g., cardboard boxes, old clothes and other combustible materials) because embers accumulate against them and they can be easily ignited.

HOW VENTS FUNCTION

Ventilated attic spaces have openings in two locations. Inlet air comes from vents located in the under-eave area at the edge of your roof. Exiting air leaves through vents located on the roof or at the gable ends of your home. If your home is built over a crawl space, you will typically have vents on each face of your home to provide cross-ventilation. Experiments conducted at the IBHS Research Center demonstrated that regardless of whether a vent had an inlet or outlet function, when wind blows against its face, it is an inlet vent. Therefore, any vented opening on your home should be able to resist the entry of embers. Unvented attic and crawlspace designs are available for some areas of the country. These designs are more easily implemented with new construction. Check with local building code officials to see if this is an option where you live.

USE MESH SCREENING TO REDUCE EMBER ENTRY INTO VENTS

Building codes require vent openings to be covered by corrosion resistant metal screens, which are typically 1/4-inch to keep out rodents. However, research shows that embers can pass through 1/4-inch mesh and ignite combustible materials, particularly smaller materials such as saw dust. Embers also can enter smaller screening, such as 1/16-inch, but cannot easily ignite even the finer fuels; however, this size screening is more easily plugged with wind-blown debris and is easily painted over if you are not careful when re-painting your house. Installing 1/8-inch mesh screening is suggested in wildfire prone areas, as it effectively minimizes the entry of embers. It's important to note that 1/8-inch screening only minimizes the size and number of embers and does not eliminate them entirely; making it very important to reduce what's stored in the attic and crawl space.

BEST CHOICES FOR VENTS TO RESIST EMBER ENTRY:

1 For (under-eave) inlet vents, opt for a soffit eave design. IBHS research demonstrates that gable end vents and other vent openings are vulnerable to wind-blown embers when the face of the vent is perpendicular to the wind flow, while embers are less likely to pass through vents with a face that is parallel to the wind flow. Therefore, soffit eave construction is preferred to open eave.

2 For outlet vents, opt for a ridge that is rated to resist wind driven rain. These vents have an external baffle at the vent inlet. Vents that have been approved for use by the [California Office of the State Fire Marshal](#).

3 Turbine vents also help keep embers out, but you should attach a piece of 1/8-inch mesh to the bottom of the roof sheathing at the opening for the vent.



©Insurance Institute for Business & Home Safety



FIREWISE USA™
RESIDENTS REDUCING WILDFIRE RISKS