

# Mitigation measures

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# FEMA

## Attic and Crawlspace Vent Details Affect Wildfire Losses

**Sacramento, CA** Direct experience with fighting fires in the wildland urban interface (WUI) has revealed that wind-driven embers pose a major threat to homes and businesses. While creation of “defensible space” around a structure and the use of fire-resistant building materials greatly reduce risk, it has become evident that small openings, such as soffit, gable, roof and crawlspace vents often allow ember penetration and loss of the structure.

Adding to the experience of the firefighters we now also have the benefit of careful laboratory research into what happens when a powerful wind brings heat and thousands of embers and firebrands into contact with a home or other building. Thanks to experiments conducted by the Institute for Business and Home Safety (IBHS), and others, we know much more about how ember entry through vents can result in ignition of combustible materials in an attic, and result in a building burning from the inside out.

Building professionals have a duty to follow all current codes and standards, but also to be knowledgeable about anticipated changes. Home and business owners may also benefit from being aware of recent research and consider retrofitting their buildings to a higher level of protection.



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### Ember resistance research facility

As an example, thanks to improved test methods for evaluating the ability of a vent to resist the intrusion of flame and embers, we now know that a 1/16<sup>th</sup> or 1/8<sup>th</sup> inch mesh screen is more effective than a 1/4 inch mesh. Some attic and roof-ridge vents now have more effective baffles or use steel wool or other materials to improve ember (and rain) resistance. Innovative vents that automatically close when exposed to high temperature are also now an option.

Professional wildland firefighters share details of their successes and failures to become better prepared to protect lives and property. One

network for exchanging critical firefighting knowledge is the Wildland Fire Lessons Learned Center, with the motto: “**A lesson is learned when we change our behavior.**” The dramatically rising toll from wildfire damage is spurring awareness as well as calls to change our behavior. Mitigation standards and practices need to evolve and become ever more effective. Improvements in attic and crawlspace vent design to reduce ember invasion is an important example of how we can make progress.

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WILDFIRE RESEARCH FACT SHEET

# Attic and Crawl Space Vents

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**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 soffited 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, soffited 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.



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### More information:

**Insurance Institute for Business and Home Safety (IHBS) Vent Study:**

<https://disastersafety.org/ibhs/wildfire-vulnerability-vents-wind-blown-embers/>

**IBHS – NFPA Attic and Crawlspace Vents and Wildfire Fact Sheets:**

<https://disastersafety.org/ibhs/ibhs-nfpa-wildfire-research-fact-sheets/>

**Marin County, CA information about innovations in vent design:**

<https://www.firesafemarin.org/hardening-your-home/vents>