Fire-Rated Roof Assemblies

Roof assemblies are the most vulnerable component of a home or building when exposed to an external fire source. Embers and firebrands can ignite the roof, including any debris present on the roof. Once a roof has ignited, the fire can spread into the building's interior, resulting in substantial damage to or total loss of the building.

Wildfires pose the greatest danger to communities. The probability that a home can survive a wildfire is influenced by the components used in a roof assembly. A roof assembly is made up of interacting roof components, including the roof deck, roof underlayment/vapor retarder, insulation (if present), insulation cover boards (if present), and the roof covering materials. Roof component types and usage govern their potential for ignition and their propensity to transfer heat into the building's interior.

Building Code Accepted Lab Test Protocol

A roof assembly's fire-resistance classification measures its relative resistance to external fire exposures. Building codes cite these classifications – **Class A, B or C** – to establish minimum fire-resistance requirements for different types of buildings and structures. To determine its classification, a roof assembly is tested by an independent fire lab using the fire-resistance capacity tests stated in a building code.

ASTM E 108: "Standard Test Methods for Fire Tests of Roof Coverings"; and **UL 790:** "Tests for Fire Resistance of Roof Covering Materials" are the fire-resistance capacity tests used to determine a roof assembly classification. Both standards essentially use the same test methods; therefore, roof assemblies successfully tested in accordance with either standard result in Class A, B or C ratings.

For tests conducted on a **DECRA Metal Roofing** assembly, when installed onto a combustible wood roof deck (generally using plywood or oriented strand board in home construction), each test standard includes:

- **Intermittent-Flame Exposure Test:** measure potential for fire to penetrate a roof assembly with a variable flame source
- **Spread-Of-Flame Test:** simulates the potential for flames to spread across the roof surface from a constant flame source. Class B and C roof coverings are permitted larger flame spread distances than Class A.
- **Burning Brand Test:** measures the roof assembly's ability to resist fire from flaming embers

Roof Assembly Fire Test Classifications

These tests include measurements of the roof surface spread of flame, the ability of the roof assembly to resist fire penetration from the exterior of the building to the underside of the roof deck, and the potential for the roof covering to develop flying brands of burning material. Roof assemblies are rated:

- **Class A** – highest rating – not readily flammable, are effective against severe fire exposures, and do not spread fire.
- **Class B** – not readily flammable, are effective against moderate fire exposures, and do not readily spread fire.
- **Class C** – lowest rating – not readily flammable, are effective against light fire exposures, and do not readily spread fire.

The fire tests demonstrate the roof covering performance during the types and duration of fire exposures involved in each test. They are not intended to prove that the roof covering will be undamaged during the tests since even a Class A roofing material can be damaged by fire.

Failure of a roof assembly is the point at which fire penetrates through the roof deck. Failure also happens if the flame spread on the roof covering is too great for the fire classification being tested.

DECRA tests its stone-coated steel roof systems on a 5:12 roof pitch, with a fan-generated 12-mph wind speed blowing across the test assembly. The gas burner is set for 1,400 degrees F for class A and B tests. Class A and B burning brands are constructed from 3/4" x 3/4" net dimension solid wood strips spaced 1/4" apart. The Class A brand is 12" x 12" overall and 2-1/4" thick; the Class B brand is 6" x 6" overall and 2-1/4" thick. The Class C brand is 1-1/2" x 1-1/2" overall and 25/32" thick with two 1/8" saw kerfs.

Class A burning brand tests use a single brand; **Class B** tests use 2 brands; and, **Class C** tests use 20 brands – each brand pre-ignited by a gas burner and placed on the roof covering exterior surface, where they burn in the 12-mph wind stream until self-extinguished and also meeting the required total test period timeframe.

Remember: Class A, B and C fire test ratings are for external fire resistance of a roof assembly – they have no direct bearing on hourly fire ratings. Hourly fire ratings are for a roof/ceiling assembly's integrity when a fire occurs inside a building. A firefighter must keep in mind that a Class A roof is no stronger than the roof deck and the rafters or trusses that support it; the roof's Class A rating has no meaning during a fire in the attic – its resistance to a fire inside the building.

Wildfire Zones and New Roof Choices

Roofs are the most vulnerable component of a building envelope in a wildfire due to their horizontal orientation and size. Keep in mind that the roof is but one element of a building envelope when protecting against wildfire potential – other material choices and surrounding property conditions can mitigate wildfire danger.

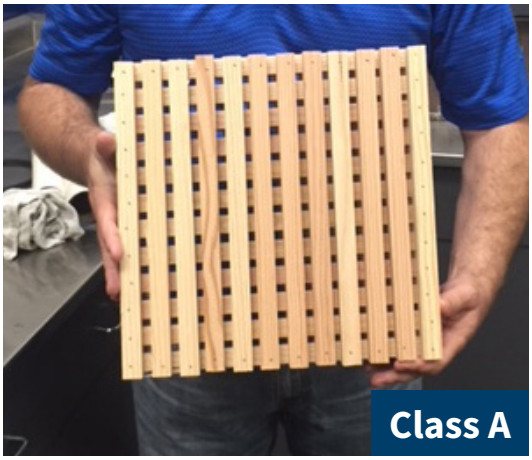
DECRA Metal Roofing offers a number of Class A and B fire rated roof assemblies for consideration. Your DECRA representative can assist with navigating the roof assembly details to deal with wildfire exposure. For California building and home owners, it's important that you know about the ***Wildland-Urban Interface***

(WUI) Code. Established to reduce wildfire spread risk from forest and desert area to life and property, the WUI code includes evaluation and identification of roof assembly product choices that resist flame spread. WUI code is not a statewide code – check with your county officials. A State of California Wildland-Urban Interface Building Codes website exists to provide helpful information.

DECRA offers not only Class A fire rated roof assemblies to comply with WUI code, but also can address Cool Color offerings for its stone-coated roof panels that meet California Title 24 energy code requirements – or for anyone else seeking to significantly reduce solar heat gain on their home or building. Combine the best of roof fire protection with an energy efficient roof providing cooling expense savings.

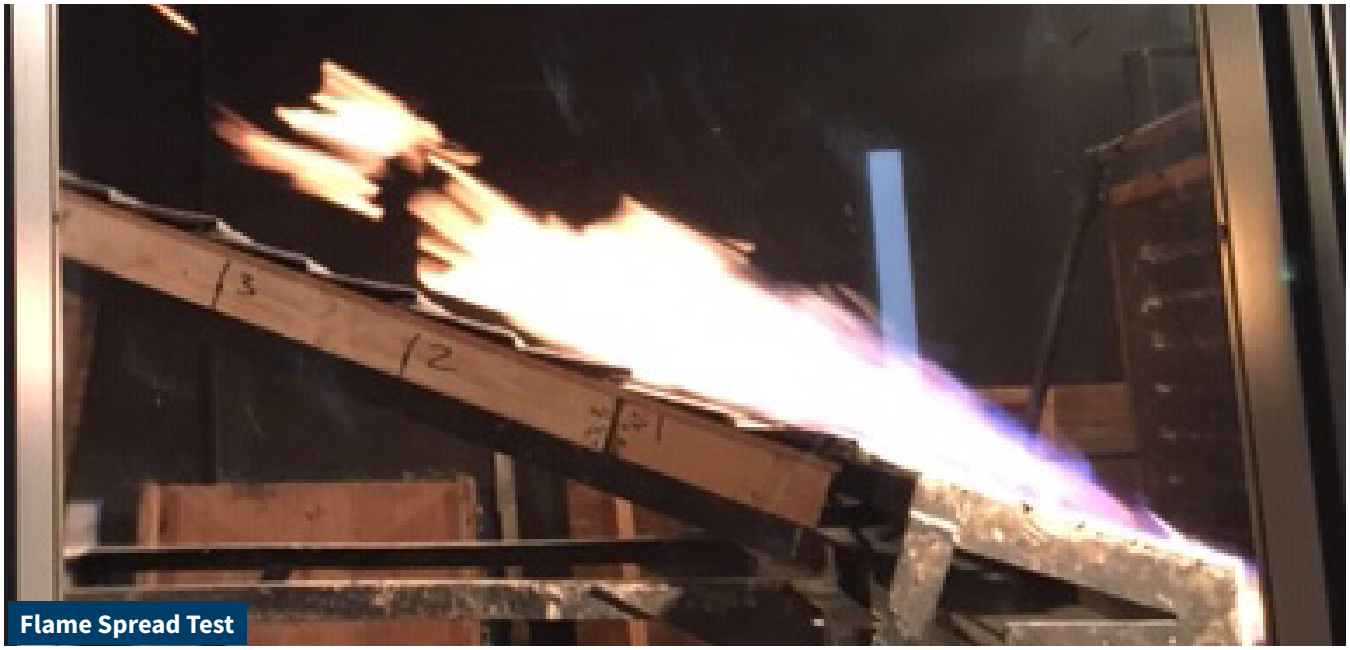
Summary

For homeowners with roof assemblies that are not Class A fire rated, the only long-term, reliable way to reduce roof vulnerability is to reroof. DECRA provides Class A fire rated reroof options when determining an optimal roof assembly mix. Be sure to consult with your DECRA reroof installation professional to also review your attic ventilation system for wildfire protective measures, as well as any other roof components that may be susceptible to wildfire danger, such as skylights.



Igniting the Wood Brand

Burning Brand Test



Flame Spread Test