

## **Home Hardening:** Role of Building Materials in Wildfire Mitigation

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## Improving Fire Resistance





## **Material Testing**

Standardized test methods are used to evaluate and compare building materials.

Test methods determine classifications of materials referenced in Building Codes ASTM E119 – Fire Resistance Rating ASTM E84 – Ignition Resistant ASTM E84 (Extended)– Fire-Retardant-Treated Wood

ASTM E108 – Class A, B, C (Roof System)



## **Building Code Definitions – Fire Resistance**

### 703.2 Fire resistance.

The fire-resistance rating of building elements, components or assemblies shall be determined in accordance with Section 703.2.1 or 703.2.2 without the use of automatic sprinklers or any other fire suppression system being incorporated, or in accordance with Section 703.2.3.

### 703.2.1 Tested assemblies.

A fire-resistance rating of building elements, components or assemblies shall be determined by the test procedures set forth in ASTM E119 or UL 263. The fire-resistance rating of penetrations and fire-resistant joint systems shall be determined in accordance with Sections 714 and 715, respectively.

## **Building Code Definitions – Fire Resistance**



## **Building Code Definitions – Ignition Resistant**

704A.3 Conditions of acceptance for ignition-resistant materials.

The material shall comply with the conditions of acceptance in Items 1 and 2 below or with the conditions of acceptance of ASTM E2768.

- 1. The material shall exhibit a listed flame spread index not exceeding 25 when tested in accordance
- > with ASTM E84 or UL 723.
  - 2. Additionally, the ASTM E84 or UL 723 test shall be continued for an additional 20-minute period, and the material shall exhibit a flame front that does not progress more than 10<sup>1</sup>/<sub>2</sub> feet (3200 mm) beyond the centerline of the burner at any time during the test period.

### 2303.2 Fire-retardant-treated wood.

Fire-retardant-treated wood is any wood product that, when impregnated with chemicals by a pressure process or other means during manufacture, shall have, when tested in accordance with ASTM E84 or UL 723, a listed flame spread index of 25 or less. Additionally, the ASTM E84 or UL 723 test shall be continued for a 20-minute period and the flame front shall not progress more than  $10^{1}/_{2}$  feet (3200 mm) beyond the center-line of the burners at any time during the test.

## **Building Code Definitions – Ignition Resistant**

### Standard Test Method for Surface Burning Characteristics of Building Materials<sup>1</sup>

1.1 This fire-test-response standard for the comparative surface burning behavior of building materials is applicable to exposed surfaces such as walls and ceilings. The test is conducted with the specimen in the ceiling position with the surface to be evaluated exposed face down to the ignition source. The material, product, or assembly shall be capable of being mounted in the test position during the test. Thus, the specimen shall either be self-supporting by its own structural quality, held in place by added supports along the test surface, or secured from the back side.





### Standard Test Method for Roof Coverings – Burning Brand ASTM E108



### ROOF

- ✓ Choose a Class A fire-rated roof maintained clear of debris
- Choose noncombustible gutters & downspouts

### **BUILDING FEATURES**

- ✓ Install ember- & flameresistant vents
- Ensure 6-inch vertical noncombustible clearance at base of wall

### WILDFIRE PREPARED HOME + PLUS

#### ADDITIONAL MITIGATION

- Remove back-to-back fencing
- Eliminate combustible siding
- ✓ Enclose eaves
- Enclose under bay windows
- Upgrade to a wildfireresistant deck
- ✓ Upgrade windows & doors
- ✓ Cover gutters
- ✓ Move outbuildings at least 30 feet away

# A PROGRAM OF IBHS

### DEFENSIBLE SPACE

- Create & maintain Zone 0 (0-5 ft) around the home including the removal of branches that overhang this area
- Clear & maintain the underdeck area; enclose lowelevation decks
- ✓ Maintain yard clear of debris
- Replace combustible fencing within 5 ft of the home



- Create & maintain the home ignition zone (0-5 ft) including the removal of branches that overhang this area
- Clear & maintain the underdeck area; enclose lowelevation decks
- Maintain yard clear of debris
- Replace combustible fencing within 5 ft of the home





- Requirements
  - Class A Roof
    - ASTM E108/ UL 790
    - Heat penetration, fire spread, and brand generation
  - Noncombustible Gutters
    - Exposure to roof deck, flaming plastic.
  - Maintained to remove debris where ember accumulate





## 



## • Vents

- Possible entry point into the building.
- Maintaining ventilation while reducing chance of ignition
- Reducing energy of embers



## Eaves & Soffits

## Eaves/ Soffits

- Enclosed and Noncombustible
- Preventing exposure to vulnerable combustible eaves





## Walls &

- 6-inch vertical noncombustible zone
- Exterior envelope radiation and direct flame contact





- 6-inch vertical noncombustible zone
- Exterior envelope radiation and direct flame contact





- 6-inch vertical noncombustible zone
- Exterior envelope radiation and direct flame contact







 Multipaned windows with at least two panes provides another layer of protection.



## Windows



- Failures of windows permit ember and flame intrusion
- Frames melt and fail under high heat exposures with high wind speeds



## Exterior Building Features

 Decks, Fences, Outbuildings











### ROOF

- ✓ Choose a Class A fire-rated roof maintained clear of debris
- Choose noncombustible gutters & downspouts

### **BUILDING FEATURES**

- ✓ Install ember- & flameresistant vents
- Ensure 6-inch vertical noncombustible clearance at base of wall

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