

# Exterior Walls



FEMA

## Purpose

To provide guidance on the design and construction of exterior walls in wildfire zones. Guidance pertains to both new and existing buildings.

## Key Issues

- Exterior walls are susceptible to wildfire flames, conductive heat, and radiant heat. Flames and heat can ignite combustible wall coverings. When exterior walls ignite, the fire can spread to other components of the building such as the roof, soffit, windows, and doors, resulting in substantial damage to or total loss of the building.
- Windborne embers and firebrands are also sources of ignition. Embers can become trapped in cracks in walls, window openings, and door trim boards and ignite combustible wall coverings.
- The fire resistance of exterior walls depends primarily on what the walls are constructed of and the amount of nearby combustible material. Some types of construction materials such as vinyl siding do not burn but can melt when exposed to high temperatures (see Figure 1), allowing the fire to reach the underlying wall components and penetrate the interior of the building.



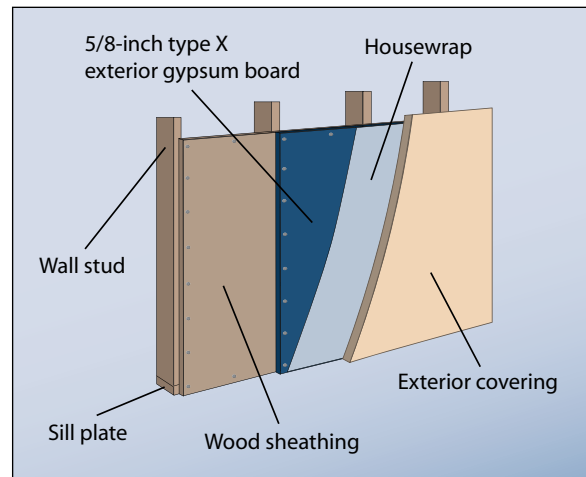
**Figure 1.** Vinyl siding that melted and warped during a wildfire (firecenter.berkeley.edu).

## Guidance for New Buildings

- For the best protection, ensure that exterior wall coverings are noncombustible or fire-resistant and not susceptible to melting. Concrete, fiber-cement panels or siding, exterior fire-retardant-treated wood siding or panels, stucco, masonry, and metal are recommended materials. With these coverings, the covering itself should not ignite and fuel the fire. Examples of the types of coverings that are not recommended are wood siding that is not fire-retardant-treated, vinyl siding, metal siding susceptible to warping, and an exterior insulation finish system.
- Ensure that the entire wall assembly has a fire-resistance rating tested in accordance with American Society for Testing and Materials (ASTM) E119. Although the above recommended types of coverings provide an initial barrier to flames, heat may pass through the covering

and ignite underlying wall components. A fire-resistance rating indicates how long under test conditions a wall assembly can prevent flames and heat from passing through the wall. A minimum fire-resistance rating of 1 hour is recommended, but higher ratings provide greater protection.

- Comply with the requirements of the fire-rated assembly, including using the exact type of materials, configuration, and attachment used during the testing that established the rating.
- For exceptional fire resistance, use insulated concrete form (ICF) walls, cast-in-place concrete, or fully grouted concrete masonry units. If ICF is selected, use a stucco or masonry wall covering to protect the plastic foam forms.
- If fiber-cement or metal wall coverings are used, install one layer of 5/8-inch type X exterior gypsum board with taped joints underneath housewrap (see Figure 2). For fiber-cement siding, the gypsum board provides secondary protection if the siding decomposes and falls away during a fire. For metal panels, the gypsum board minimizes the transfer of heat radiated from the metal panels to other wall components.
- For vinyl siding (note that vinyl siding is not recommended), install one layer of 5/8-inch type X exterior gypsum board with taped joints underneath housewrap. If the vinyl and housewrap melt during a fire, the underlying gypsum board will provide some protection.
- Use noncombustible or fire-resistant material such as exterior fire-retardant-treated wood or fiber-cement for trim boards around doors, windows, eaves, and corners.



**Figure 2.** Example of a fire-rated wall assembly.

## Guidance for Existing Buildings

- Replace exterior wall coverings that are combustible, are susceptible to melting, or can readily transmit heat with one of the recommended coverings listed above. Examples of the types of coverings that need to be replaced are wood siding that is not fire-retardant-treated, vinyl siding, metal siding, and an exterior insulation finish system.
  - Before replacing vinyl or metal siding, check whether there is an underlying gypsum board substrate. If so, remedial work may not be needed.
  - Determine whether keeping the existing covering and covering it with 5/8-inch type X gypsum board and a new covering is a viable option.

## Considerations

- For stud walls, metal studs can be used in lieu of wood studs. Metal studs do not ignite, but they transfer heat more readily than wood studs and can deform and collapse at temperatures that can occur in a wildfire. Current data are insufficient regarding the wildfire performance of

walls that have wood studs versus metal studs.

- Maintaining and removing combustible debris (such as vegetation and leaves) and firewood near the exterior walls regularly reduce a building's vulnerability to ignition during a wildfire (see Fact Sheet #4, Defensible Space).

## Effectiveness

A wall assembly with one of the recommended coverings and a minimum 1-hour fire-resistance rating is effective in all Fire Severity Zones.

## Resources

ASTM E119 -08a Standard Test Methods for Fire Tests of Building Construction and Materials.

<http://www.astm.org/Standards/E119.htm>.

Materials and Construction Methods for Exterior Wildfire Exposure: Exterior Wall Siding and Sheathing SFM Standard 12-7A-1, 2001 California Referenced Standard Codes (Part 12, Title 24, C.C.R.). [http://www.fire.ca.gov/fire\\_prevention/downloads/%20Part\\_12\\_CA\\_SFM\\_12-7A-1\\_Test\\_Standards.pdf](http://www.fire.ca.gov/fire_prevention/downloads/%20Part_12_CA_SFM_12-7A-1_Test_Standards.pdf).

