

Exterior Doors



FEMA

Purpose

To provide basic guidance on the design and construction of exterior doors, including garage doors, on buildings in wildfire zones. Guidance pertains to both new and existing buildings.

Key Issues

- Exterior doors are subject to the same types of exposure as exterior walls in a wildfire (see Figure 1). However, exterior doors are typically much thinner and less fire-resistant than exterior walls and can therefore burn through much faster.
- Flames and hot gases can ignite combustible materials in a door and door frame.
- Flames and hot gases can penetrate openings between the door and frame and between the door and threshold (or floor if no threshold exists).
- Embers can become lodged in openings between the door and frame and between the door and threshold (or floor if no threshold exists). Embers can also be blown through the openings into the interior of the building.
- Flames, convective or radiant heat, and airborne firebrands can break glass in a door.

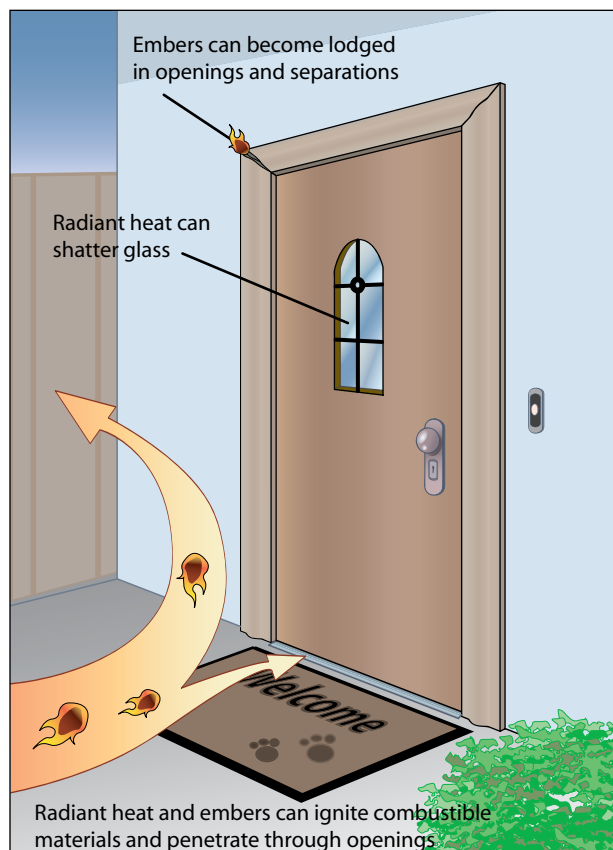


Figure 1. Types of exposure that exterior doors can be subject to in a wildfire.

Exterior Door Characteristics and Ratings

Types of exterior doors include solid entrance doors, entrance doors with glass vision panels, sliding glass doors, storm doors, screen doors, garage doors, and cellar doors.

Solid exterior doors are typically made of wood or metal. Doors with a solid, noncombustible mineral core are classified as fire-rated doors and are rated by Underwriters Laboratories (UL) according to the length of time they can resist fire (UL Standard 10C) (UL, 1998). UL

classifications for interior and exterior fire-rated doors and their frames range from 3-hour to 20-minute ratings. Exterior fire-rated doors are available with a rating of 1½ hour or ¾ hour.

The fire rating for doors is intended to equal three-fourths of the fire rating of the surrounding wall. For example, a door with a 1½-hour rating is intended to be used in a wall with 2-hour rating, and a door with a ¾-hour rating is intended to be used in a wall with a 1-hour rating. However, a door with a higher fire rating may be used.

Guidance for New Buildings

- If a fire-rated exterior wall is specified (see Fact Sheet #7, Exterior Walls), specify and install a fire-rated door and frame. As explained above, the rating of the door and frame should be at least three-fourths of the rating of the wall. In addition, specify and install fire-rated hardware.
- Follow the guidance pertaining to door glass vision panels and glass sliding doors in Fact Sheet #10, Windows and Skylights.
- To avoid embers and hot gases penetrating the interior of the building between the door and the door frame, install adjustable weatherstripping on the interior side of the door frame and specify and install an automatic door bottom or threshold weatherstripping. The weatherstripping and door bottom should be tested in accordance with UL Standard 10C. Weatherstripping is relatively inexpensive (see Figure 2).
- Garage doors are typically made of wood, aluminum, or steel and are insulated or non-insulated. Unlike standard egress/ingress doors, garage doors are not normally tested for fire resistance (see Figure 3). To protect the garage door and entire building, follow the guidance listed below.
 - Specify and install insulated, metal garage doors.
 - To avoid embers and hot gases penetrating the garage, specify and install weatherstripping that has been tested in accordance with UL Standard 10C around the entire garage door.

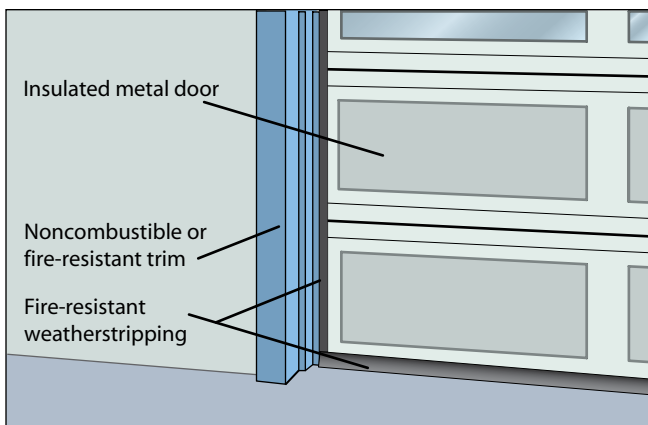


Figure 3. A garage door with noncombustible and fire-resistant components.

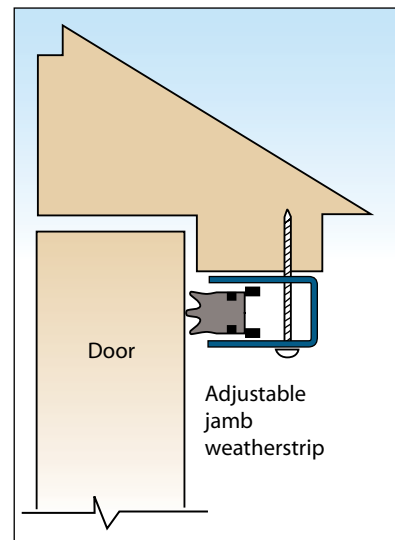


Figure 2. Example of adjustable weatherstripping (FEMA 577).

- For exterior trim that covers the opening between the door frame and exterior wall, specify and install noncombustible or fire-resistant material such as fire-retardant-treated wood or fiber-cement board.

Guidance for Existing Buildings

- Add weatherstripping to doors, as described above.
- Replace vision panels in doors, if necessary, as described in Fact Sheet #10, Windows and Skylights.
- Replace sliding glass doors and/or protect with shutters, as described in Fact Sheet #10, Windows and Skylights.
- Replace wooden garage doors, particularly if they do not have a solid core.
- Replace wooden egress/ingress doors without a solid core, although egress/ingress doors are often relatively fire-resistant compared to other components of the building and therefore not normally a high priority for remediation.

Considerations

Metal and metal-clad door frames can transmit heat during a fire, and the heat can ignite the surrounding exterior wall if the wall is not constructed to fire-resistant standards, as noted above. For more information, see Fact Sheet #7, Exterior Walls.

Effectiveness

All mitigation measures listed in this Fact Sheet are effective in all Fire Severity Zones except as follows:

- Garage doors are not normally tested for fire resistance and may not provide effective fire resistance in high Fire Severity Zones.
- Under very high heat or prolonged exposure to heat, weatherstripping material can melt or burn, lowering its effectiveness in preventing embers and hot gases from entering the interior of a building.

Resources

FEMA. 2007. *Design Guide for Improving Hospital Safety in Earthquakes, Floods, and High Winds: Providing Protection to People and Buildings*. Risk Management Series, FEMA 577. <http://www.fema.gov/library/viewRecord.do?id=2739>.

Steel Door Institute (SDI). 2001. *Basic Fire Door Requirements*. Technical Data Series SDI 118-01. <http://www.steeldoor.org/res/118.pdf>.

Underwriters Laboratory (UL). 1998. UL Standard 10C, Positive Pressure Fire Tests of Door Assemblies.

