

# Window Pane Failure During Exterior Fire Exposure

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## Research Motivation

Window failure as a result of exterior fire exposure creates a pathway for embers, flames, and hot gases to enter a building and ignite interior combustibles. There is a need to better understand window failure during exterior fire exposure to properly inform building codes and homeowner guidance in both wildland urban interface and urban communities.

## Research Objectives

- Identify differences in the failure of four types of double pane window assemblies with plain glass and/or tempered glass panes during exterior fire exposures.
- Quantify the heat flux measured behind the four types of window pane assemblies and compare to critical heat flux values for ignition of common household materials.

## Key Findings

- Window pane assemblies with plain glass on the fire (exterior) side and tempered glass on the back (interior) side outperformed windows with the opposite configuration (see Figure 1).
- Window pane assemblies with both panes tempered glass performed the best of the four types considered in this study.
- Heat transfer through windows has the potential to ignite interior combustibles even without window failure.
- Frames and other window components should also be considered when addressing window failure from exterior fire exposure.

**Figure 1**

