

# RETROFIT Improvements

## Install Protective Film on Windows

Making  
Homes  
Safer in  
Disasters

### Retrofit Opportunity

- Protective film can be installed at any time

### Purpose

- To prevent windows from shattering during a seismic event

### Benefits

- Ensures occupant safety during high winds, an earthquake, or impact

### Hazards

Wind



Rain



Flood



Seismic



Fire



Snow



### Summary

A brittle material such as glass can fail suddenly during an earthquake or from windborne debris, throwing shards of glass throughout a room and injuring those nearby. Tempered glass, similar to the glass installed in automobiles, is designed so that the glass will break but the pieces are less likely to be sharp, jagged pieces that will seriously injure someone. Installation of a protective window film is a less expensive option than tempered glass to protect building occupants from glass fragments.

Known as Shatter Resistant Window Film (SRWF), the plastic film is applied to the inside of the window to protect building occupants from shattered glass, which occurs when a considerable amount of pressure is applied to a window. While it is not a building code accepted substitute for impact resistant finishes in high wind areas, SRWF in 4 or 8 mil thicknesses provides a sufficient level of protection in emergency situations when used for earthquake and blast protection from broken window glass.

Window film is available with optional coatings that tint the window glass and reduce glare and solar heat gain. A film with a reflective coating and low solar heat gain co-efficient (SHGC) would have an energy efficiency benefit as well as offer glass shatter protection. Decorative and opaque styles of window film are also available, thus, installation of window film can serve a number of purposes. Window film is applied to the inside of a window. Note that reflective coatings can cause heat build-up in dual glass paned units—or the glass may already have a reflective coating—so be cognizant of the type (or age) of the windows before selecting the window film.

Window film is self-adhering and applied with a light spray of water on clean glass with a squeegee. Films meant to protect against glass shatter by high winds should also be secured with an anchoring system around the glass perimeter, which holds the sheet in the frame should the glass break. Generally, the thicker the film, the more difficult it is to install. There are many professional installation firms because films have been added to glazing in the commercial sector for many years.

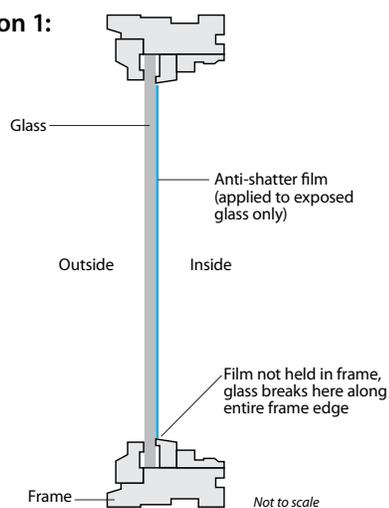
Applying shatter resistant window film to your windows can be a “Do-It-Yourself” project, however, special tools are required and the job gets tougher as the thickness of the film increases. Clear film that is 4 mils thick in large quantities (500 square feet) costs approximately \$.75 per square foot. Eight mil window film, rated and tested for hurricane protection, is 60% more costly (\$1.20/sq. ft.). Window films with a reflective coating and SHGC below .30 are twice as much as the clear versions at the given thickness. Smaller window film quantities, which cover several windows, are available at big box retailers for \$50.

Professional installations will cost \$6 - \$12 per square foot dependent on film specifications and size of the project.

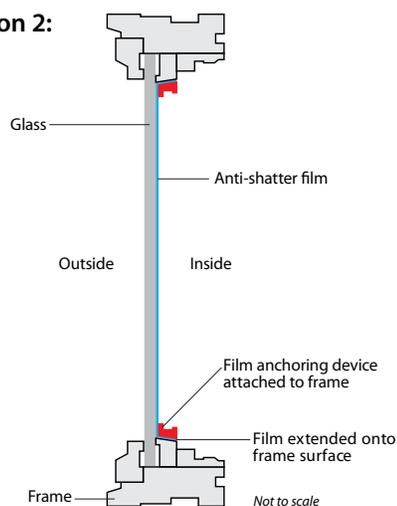
### Illustrations

#### Retrofit

##### Option 1:



##### Option 2:



## Potential Damage



Photo: [www.fema.gov](http://www.fema.gov)

## Key Steps

- Examine windows and determine their features (i.e., double paned, reflective (Low-E) coating, etc.).
- Select the desired window film and appropriate tools or solicit bids from professional installers.
- Follow manufacturer's instructions to apply the window film.
- Consider impact resistant glazing on windows that are at greatest risk.
- Your contractor may have additional ideas on how to improve the safety of your home.
- For more details about this retrofit improvement, please refer to the list of Resources in the section below.

## Resources

Institute for Business & Home Safety, *Interior Seismic Protection*

<http://www.disastersafety.org/publicPolicy/legislation/article;jsessionid=497B67ED66A233FF635CB6AF814ACBE?articleId=5036>

Insurance Institute for Business & Home Safety, *Top 10 Structural Retrofits*

<http://disastersafety.acfconsulting.com/projects/?id=2513&category=1102>

International Window Film Association, *Window Film Info Center*

<http://www.iwfa.com/ConsumerInfo.aspx>

National Institute of Building Sciences, *Retrofitting Existing Buildings to Resist Explosive Threats*

[http://www.wbdg.org/resources/retro\\_rstexplo.php](http://www.wbdg.org/resources/retro_rstexplo.php)

