

Solar Films

A Pacific Energy Center Factsheet

Introduction

Applied solar control films, also known as adhesive-backed films, are the most common retrofit technology for an unanticipated heat gain or glare problem. These thin metalized polyester films use an adhesive backing to attach the film to the inside surface of existing windows.

Applied window films have changed dramatically since first introduced in 1968 and bear little resemblance to early products, which scratched or peeled easily and had only a short life. Current products are highly scratch-resistant, the adhesives are long lasting, optical clarity is excellent and the films generally hold up 5-15 years depending on environmental and other variables. However, quality varies among manufacturers. Choose one with an established reputation in this technology.

The performance advantages of films include solar heat reduction, glare reduction, UV reduction, increased shatter resistance, and some improvement in insulation value. Films are typically a highly cost-effective retrofit technology.

PG&E offers rebates for film applied in commercial buildings, for single pane south-, east- and west-facing windows. Visit the Express Efficiency page or contact your local PG&E office for more information.

Current Standard Films

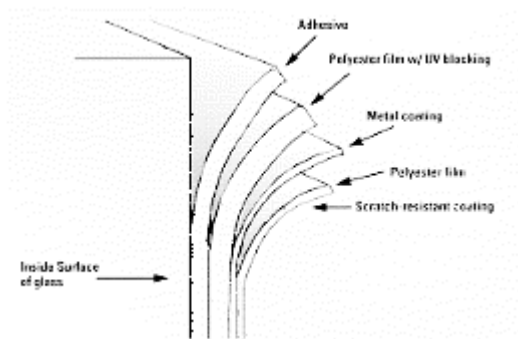


Figure 1. Multi-layer Assembly

Window films are multilayer assemblies of coatings and polyester films, as shown in the figure. In most quality films, the exposed layer is a scratch-resistant coating. Next is a polyester film, either clear or color-dyed. The inner surface of the film is coated with a thin metallic layer, which serves as a reflector to reduce unwanted solar heat gain. Another layer of polyester film is laminated to the first one to seal and protect the metal layer. This second film contains ultraviolet inhibitors and a dye, if desired. The adhesive is coated to this surface, along with a release liner to cover the

adhesive until application. If desired, a third dyed polyester film can be added just behind the scratch-resistant outer coating to modify the window's color.

Newest Development in Films

Films typically darken a window and add a degree of visible reflectivity, giving a mirror-like look to the glass, particularly with films that offer low daylight transmission and the highest degree of solar control. The newest innovation in window films provides good solar control while leaving the window's appearance relatively unchanged. These spectrally selective films use special metal coatings similar to the technology used in a low-E window.

Durability

The effective life of window film depends on several variables, including type of film, type of glass, window construction, window orientation and climate. Five to ten years is probably a typical life span; however, there are documented cases of films lasting 18 years or more. All quality films are guaranteed for a minimum of five to ten years. A number of manufacturers, under special circumstances, have been offering lifetime warranties for their products. Contact a manufacturer for more information regarding likely durability for a particular application.

Appropriate Applications

Films are used for solar control in both commercial and residential buildings. Generally, commercially oriented film products have a high degree of solar control and a significant level of reflectivity. Residential products usually offer a more neutral look with less solar control.

Most windows can take an applied film. There are some conditions in which manufacturers do not recommend the application of film on glass due to increased thermal stress. An example of this would be use of a dyed film on a partially shaded window. The dye absorbs solar energy and heats the glass, creating a large temperature difference between sunlit and shaded portions of the window; if the difference is large enough, the glass will break. Other circumstances where applied solar control film is not recommended include:

- Single panes larger than 100 sq. ft.
- Double panes larger than 40 sq. ft.
- Clear glass thicker than 3/8"
- Tinted glass thicker than 1/4"

- Laminated, reflective, wired, textured or patterned glass
 - Triple-pane glass
 - Visibly damaged glass
 - Glass where sealant or glazing compound has hardened
 - Glass in concrete, solid aluminum or solid steel framing
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How Film Is Applied

Manufacturers require the application of film by a professional in order to offer warranties, since the installation process is a factor in the life of the film.

Although the film would function thermally much better if it was applied on the outside face of the glass, the life of it would be shortened considerably. All films presently are applied on the inside face of the glass.

The two basic types of adhesives used are pressure-sensitive types and water-activated types.

- Pressure-sensitive adhesives are soft and tacky, and they simply stick to the glass with pressure. A variation of this type is detackified pressure-sensitive adhesives in which a thin polymer coating covers the tacky adhesive to make the film tack-free for easier handling.
- Water-activated adhesives are hard, non-tacky materials that chemically bond to the glass when activated by a mounting solution.

Installers use the following steps for applying films to the inside of the glass:

- The window is cleaned using a razor blade and suggested cleaning solutions. These solutions are relatively non-caustic and cause minimum, if any, noticeable odor.
- All edges and emollients are cleaned.
- A spray of water and mounting solution (the mounting solutions are non-caustic) is applied to the window.
- The film is applied onto the mounting solution, squeegeed and cut to size.
- The window is cleaned again to remove fingerprints, etc.

Maintenance

Quality films include scratch-resistant coatings as a standard feature, which virtually eliminate any need for extra precautions in cleaning. Windows with film are easy to clean without damage as long as a few guidelines are followed:

- Use a soft, clean cloth, soft paper towel or clean synthetic sponge.
- Use a soft cloth or squeegee for drying the window.
- Use any normal glass cleaning solution that contains no abrasive materials.

For More Information

Visit www.pge.com for more information about PG&E's energy efficiency programs and other services.

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