



Global / Express Window Films
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Solar Control Window Film & Glass
Selecting The Right Film

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Solar Energy & Its Effect On Glass

As solar control window film continues to grow in popularity, it's more important than ever to understand exactly how the installation of film impacts flat glass. When the proper window film is installed on undamaged glass, there are seldom any problems. However, under certain circumstances the installation of an improperly selected window film can contribute to thermal stress fracture (TSF) and even lead to insulated glass unit (IGU) seal failure.

Circumstances that may promote TSF and/or IGU seal failure include:

1. Improper film choice
2. Pre-existing flaws or imperfections in the glass
3. Tightness of glass framing or fitting
4. Rapid temperature changes and shading
5. Environmental conditions

Glass Without Window Film

To help you select the correct window film you need to understand what happens when solar energy strikes a pane of glass. In untreated glass, most of the solar energy is transmitted. Only a small amount is reflected and absorbed as shown in illustration #1.

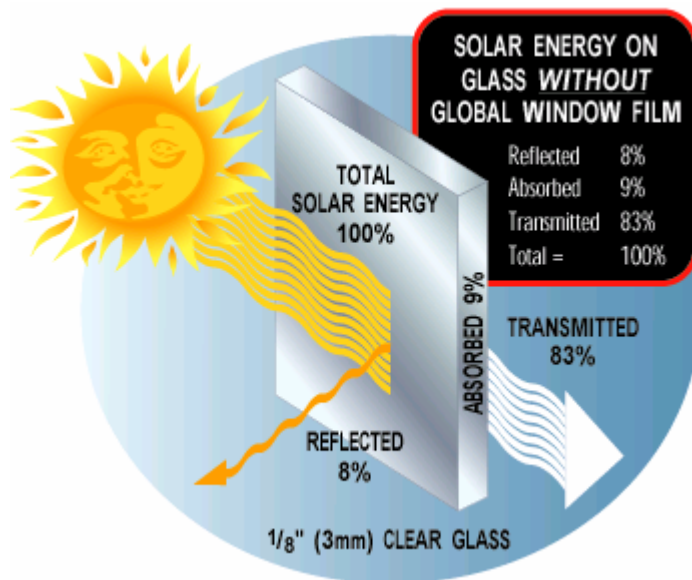


Illustration #1

Untreated glass allows most of the solar energy to transmit causing hot spots and fading of valuable furnishings. Select Global window films can reject up to 78% of total solar energy and almost 100% of harmful and damaging ultraviolet.

Glass With Window Film - A Dramatic Transformation

Installing window film on a pane of glass can dramatically change how it reflects, transmits and absorbs solar energy. The degree of that change is determined by the construction characteristics of the window film you select. Illustration #2 shows how window film can significantly reduce solar energy transmission by increasing reflection and absorption.

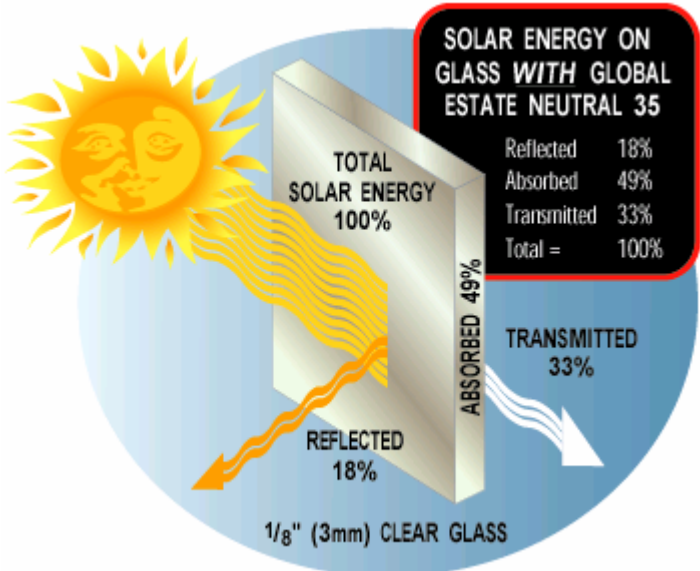


Illustration #2

Global architectural window films effectively reduce the amount of solar energy transmitted through the glass and many versions are almost undetectable once installed.

Heat Absorption, TSF & IGU Seal Failure

Once installed, almost all window films will cause increased heat absorption in the glass pane treated with film. It is this heating of the glass that results in thermal expansion, which on certain installations, can increase the risk of thermal stress fracture (TSF) and/or insulated glass unit (IGU) seal failure.

When thermal expansion occurs in a single pane, the result can be glass breakage—typically a small crack. When thermal expansion occurs in an insulated glass unit (IGU) the inside pane treated with window film can expand more than the untreated outside pane. This causes a disparity in thermal expansion between the two panes of glass, which may result in thermal stress fracture or IGU seal failure, allowing moisture to get in between the panes.

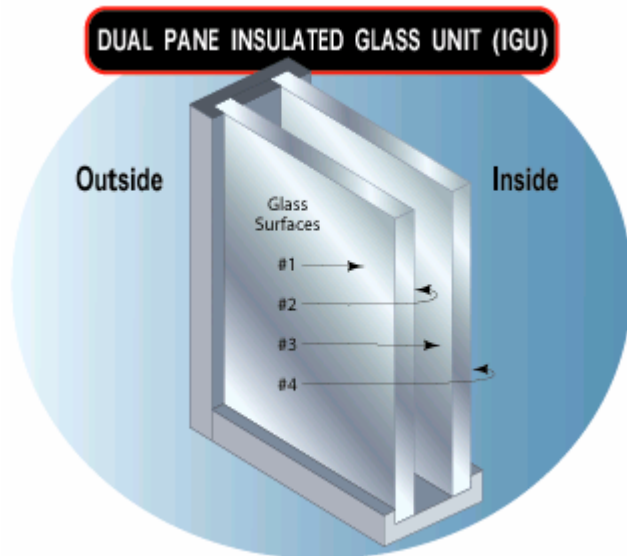


Illustration #3

Window film is installed to the inside pane (glass surface #4) of a dual pane IGU. Selecting an improper film for this application can cause the glass pane treated with window film to experience excessive thermal expansion at a higher rate than the untreated outside pane, threatening the IGU seal and/or causing thermal shock fracture. Many Global window films are safe for IGU applications—ask your Global dealer for details.

Selecting The Right Film

A key consideration in the selection of a window film is its solar absorption rating. To address this concern, your independent Global window film dealer offers a full range of advanced window film products that deliver excellent solar rejection performance without excessive heat absorption. Your dealer will make a thorough assessment of your glass, framing and window types to help you select the right film for your particular application.

[Installation Proposal Form - image here]

To help make your purchase decision, your independent Global dealer will provide you with a detailed installation proposal that includes important information about the characteristics of the job with a film selection recommendation.

Assessing Installation Characteristics

Your dealer will inspect the characteristics of the entire installation noting items such as improper framing as well as pre-existing imperfections that can increase the risk of glass breakage or seal failure. Here are some of the problematic items your dealer will look for and note on your installation proposal if applicable.

- **Flaws & Imperfections In Glass** - Sometimes tiny chips or cracks may exist at the edges of the glass pane which are often not easily detectable because they can be hidden by the window frame. In these instances, installing even an approved film can lead to possible problems. That's why your dealer will inspect every glass pane thoroughly in order to provide you with the best possible installation proposal.
- **Tightness Of Glass Framing & Damaged Molding** - Glass naturally expands when heated and contracts when cooled. If a glass pane is fitted too tightly in its frame there may not be much room for it to expand. When window film is installed, even window film with an approved absorption rate, thermal expansion can become problematic. Glass in an overly tight frame or a frame with damaged or dried out molding, has a higher probability of TSF or IGU seal failure.
- **Rapid Temperature Changes & Shading** - Thermal stress can also be caused by uneven heat absorption on the surface of the glass. This can occur when glass is partially shaded by trees or buildings. Often this shading is enough to cause an extreme difference in glass surface temperatures. Another cause of TSF is a dramatic and rapid change in temperature, such as the kind of changes that often occur from night to day in mountainous areas or in the desert. When glass does not have time to cool or heat slowly, its surface temperature may be uneven, leading to a higher risk of TSF or IGU seal failure.
- **Environmental Conditions** - Even with the best location and proper film selection, it's possible for glass to suffer TSF or IGU seal failure if the immediate environment around the window does not have appropriate air circulation. Heat can become trapped against the glass if there is not enough space between blinds or other window treatments and the pane. If heat becomes trapped, it can lead to excessive thermal absorption and eventual glass breakage or IGU seal failure.

Film-To-Glass Installation Guidance

The best way to minimize the probability of TSF and IGU seal failure is to choose a proper film. To accomplish this, your dealer will do a thorough assessment of the glass and related installation characteristics. Using the film-to-glass installation guidance chart, your dealer will help you select a professional quality Global window film that's right for your application. The chart displays TSF IGU warranty coverage availability based on one of three numerical ratings (#1-approved, #2*-written approval needed, and #3*-not available). Select films will also come with a caution when applied to insulated glass units that have a low-e feature. The most current version of the film-to-glass installation guidance chart (GWF catalog #4050) may be view online at GlobalWindowFilms.com.

**The unavailability of TSF IGU warranty coverage does not certify that TSF or IGU seal failure will occur— it only means the warranty coverage is not available.*

Glass With Low-E Coating

Insulated glass units with the low-e feature are becoming increasingly popular because they help retain inside room heat. Some film-to-glass installations on glass with the low-e may produce an increased risk of TSF and IGU seal failure. Low-e scenarios that affect film-to-glass installation ratings are as follows:

Global window films with a shading coefficient greater than .70 automatically receive a #2 film-to-glass installation rating when applied to glass with a low-e coating on glass surface #3.

Installations Larger Than 2,500 Square Feet

Regardless of a film-to-glass installation rating, any job over 2,500 square feet will require a TSF IGU warranty application and written approval to ensure TSF and IGU seal failure warranty coverage.

Product Failure Warranty Coverage [warranty image here]

Every Global window film comes with a product warranty that covers replacement film and reasonable re-installation costs to protect customers from product defects or failure such as poor adhesion or demetallization. The product warranty does not cover TSF IGU perils. The terms of the product warranties vary in length and amount of coverage depending on the film type selected. The most current version of the residential and commercial product warranties (GWF catalog #4010 & #4020) may be viewed online at GlobalWindowFilms.com.

TSF IGU Seal Failure Warranty Coverage [warranty image here]

All #1 film-to-glass installation ratings qualify for TSF IGU warranty coverage at no extra charge. To obtain written approval for TSF IGU warranty coverage for any #2 film-to-glass installation rating, your dealer will submit a completed TSF IGU warranty application (GWF catalog #4060) and applicable fee. If the application is not approved the fee will be refunded in full. The most current version of the TSF IGU warranty (GWF catalog #4040) may be viewed online at GlobalWindowFilms.com.

TSF IGU Seal Failure Warranty Application Procedures

Applications for TSF IGU warranty coverage can be submitted up to 30 days after the installation is completed, although coverage will not become valid until the warranty service department has approved an application in writing.

Application for TSF IGU warranty coverage will require copies of the following papers:

1. All parts of completed TSF IGU warranty application form (GWF #4060)
2. Buyer's valid/in-force window manufacturer's TSF IGU glass warranty
3. Check for TSF IGU warranty fee made payable to: Global PET Films, Inc.
4. Work sheet & photos displaying all windows & frames applicable

Include copies of these items to TSF IGU warranty application if the installation is done:

1. Buyer's GWF product warranty certificate
2. Buyer's purchase invoice from the installing dealer

How To Calculate TSF IGU Warranty Fees

Cost for TSF IGU warranty coverage can be calculated using the following schedule:

TSF IGU Warranty Fee Schedule	
Square Feet Calculation	\$50 Minimum
1 To 2500	.14 Per Sq. Ft.
2500 To 5000	.12 Per Sq. Ft.
5001 To 7500	.10 Per Sq. Ft.
Over 7500 Square Feet	Quote

Warranty Fee Calculation Example	
Job Size - Square Foot	425
Warranty Cost Per Square Foot	x .14
TSF IGU Warranty Cost	\$ 59.50

Film-To-Glass Installation Guidance Chart [Chart Here]

Film-To-Glass Installation Cautions

TSF IGU warranty coverage is **NOT AVAILABLE** if any of the following conditions exist:

1. Any building with a history of glass breakage and/or IGU seal failure
2. Any chipped, cracked, scratched or otherwise damaged glass prior to installation
3. Any IGU with seal failure prior to installation
4. Any IGU greater than 40 square feet
5. Any triple or quadruple pane IGU
6. Any single glass pane totaling more than 60 square feet
7. Any single glass pane with a glass edge dimension greater than 10 feet
8. Any single clear glass 3/8 inch or thicker
9. Any single tinted glass 1/4 inch or thicker
10. Any glass where the film is not installed edge to edge
11. Any glass with more than one window film installed on top of each other
12. *Any glass experiencing up to 25% outside shading, including more than 25% of the glass parameter (see harmful shading examples below)
13. Any plastic, polycarbonate or non-glass surface
14. Arched glass is approved but any laminated, textured, round, bent, patterned, wired or skylight glass is not
15. Any glass with paint, lettering and/or vinyl graphics
16. Any framing system of concrete or solid aluminum or solid steel
17. Any framing sealants, glazing compound, and/or gaskets that are no longer resilient
18. Any film-to-glass installation chart rating #2 unless written approval has been obtained. (See GWF Catalog #4060 – TSF IGU Warranty Application Form)
19. Any film-to-glass installation chart rating #3.
20. Any film-to-glass installation over 2,500 square feet in size, unless written approval has been obtained. (See GWF Catalog #4060 – TSF IGU Warranty Application Form)

*Harmful Shading Examples Specific To Item #12 Above

