# FILM TO GLASS RISK ASSESSMENT CHART

In certain cases, the application of window film can increase the risk of glass breakage or seal failure. The age, condition and type of construction of the glazing system can limit or even prohibit the application of window film. The following **Film to Glass Risk Assessment Chart** will assist you in determining the risk of glass breakage for specific film to glass type combinations. Ultimately, you need to make the final decision as to the total amount of risk you are willing to take with the help of your independent installer.

**These recommendations are based on solar specifications representing film mounted on 1/8" (3mm) clear glass.**

| FILM TYPE | CLEAR SINGLE PANE | CLEAR DUAL PANE | CLEAR TEMPERED SINGLE/DUAL PANE | TINTED/LOW E SINGLE PANE | TINTED/LOW E DUAL PANE | TINTED/LOW E TEMPERED SINGLE/DUAL PANE |
|---|---|---|---|---|---|---|
| **Sunlight** | | | | | | |
| SUN 70 | L | L | L | L | L | L |
| **Palisade** | | | | | | |
| PD 50 | H | H | M | H | H | M |
| PD 45 | M | M | M | H | H | L |
| PD 40 | M | M | L | H | H | L |
| PD 75 EXT | L | L | L | L | L | L |
| **NightScape** | | | | | | |
| NS 35 | L | M | L | M | M | L |
| NS 25 | L | M | L | M | M | L |
| NS 15 | L | M | L | M | M | L |
| NS 07 | L | M | L | M | M | L |
| NS 05 | H | H | M | H | H | M |
| **ScenicView** | | | | | | |
| SV 50 | L | L | L | L | L | L |
| SV 35 | L | L | L | L | L | L |
| SV 25 | L | L | L | L | L | L |
| SV 10 | L | L | L | L | L | L |
| SV 50 EXT | L | L | L | L | L | L |
| SV 25 EXT | L | L | L | L | L | L |
| SV 10 EXT | L | L | L | L | L | L |
| **DaylightNatural** | | | | | | |
| DN 60 | L | L | L | L | L | L |
| DN 50 | L | L | L | L | L | L |
| DN 35 | L | M | L | M | M | L |
| DN 20 | M | M | L | H | H | L |
| DN 35 EXT | L | L | L | L | L | L |
| DN 20 EXT | L | M | L | M | M | L |
| **Sunset Bronze** | | | | | | |
| SB 30 | L | L | L | L | L | L |
| SB 20 | L | L | L | L | L | L |
| **Solar Silver** | | | | | | |
| SS 35 | L | L | L | L | L | L |
| SS 20 | L | L | L | L | L | L |
| SS 35 EXT | L | L | L | L | L | L |
| SS 20 EXT | L | L | L | L | L | L |
| **Architectural** | | | | | | |
| MBL 35 | L | L | L | M | M | L |
| MBL 20 | L | L | L | M | M | L |
| MGN 35 | M | M | L | H | H | L |
| MGN 20 | M | M | M | H | H | L |
| MGD 35 | L | L | L | L | L | L |
| MGD 20 | L | L | L | L | L | L |
| **Specialty Series** | | | | | | |
| UV CLEAR | L | L | L | L | L | L |
| WHITE FROST | L | L | L | L | L | L |
| BLKOUT | H | H | M | H | H | M |

**KEY:** Assessment assumes the glazing system is in good condition.

- L – LOW – glass breakage or seal failure unlikely
- M – MEDIUM – window system needs to be carefully inspected and evaluated
- H – HIGH – not recommended due to the high probability of glass breakage or seal failure

Johnson® Window Films
www.johnsonwindowfilms.com

These recommendations are only valid for glazing systems in good condition and the viability of film installation must be established. Any defects such as chipped glass, unpolished glass edges or poor frame construction can greatly increase the risk of glass breakage. The frame or objects inside the frame such as screws or nails cannot hinder normal thermal expansion of the glass. Appraisals are based on the following criteria: Max pane sizes is **< 48 sq. ft. (4.5 sqm) ≤ 1/4" (6mm)** thick, resilient and functional gaskets, no internal window dressings, no external shading, altitude below 750m, no AC vents pointed at window, climate range from **32°** to **104°F (0 to 38c)** max and project size of **2,000 sq ft (185 sqm)**.

# WHY GLASS BREAKS

Window film rarely, if ever, breaks glass by itself. However, window film can exacerbate flaws that may cause the window pane to crack, which happens in less than 1/2 percent of installations. A thorough inspection of the condition of the glass and frames can help determine the risk of installing window film. The common causes of glass breakage are outlined below.

## Reflecting and Absorbing Solar Energy

Window film reduces solar heat gain into a building by both reflecting and absorbing the solar energy. It is the "absorption" portion that can increase the risk of glass breakage. Absorption causes the glass to heat up and therefore expand more than it would without the film. This expansion, combined with a "flaw" condition, increases the risk of breakage. The flaws are often in the glass, but poor window installation or locations are also common culprits. These flaws are often on the edge of the glass, which cannot be seen when examining a window.

## Exterior Shading

Exterior shading is the #1 cause of glass breakage. The concept is simple regarding exterior shading. The sun hits part of the window, causing it to heat up and expand, while the shaded portion does not change because it is still cool. The resulting stress of the two parts fighting each other (one part expanding and one part not) causes glass breakage. Clear safety film does not cause this phenomenon because it has very low absorption.

## Nicked Edges

Some common causes of glass breakage cannot be seen before film installation. The edge of the glass is hidden inside the "bite" of the window where a chip or crack can cause a break. Panes of glass are supposed to be ground smooth before installation in a window. This grinding provides a smooth, strong surface that greatly increases the edge strength of the glass. Unfortunately, sometimes when making a window, the manufacturer allows chipped edge glass to be used. It is cheaper than cutting a new piece of glass and they assume you will never know. Any chip or nick in this smooth edge greatly lowers the overall strength of the glass pane. Cracks will often originate from this point as the pane expands.

## Edge Stress

Another major cause of glass breakage stems from edge stress from the frame. Glass is supposed to be installed with a little "expansion" space on all sides. If the glass is a little too large and mounted resting on the frame with no spaces, or up against a mounting screw, the edge stress can become too great when sun hits the newly tinted window, causing it to expand. If the glass breaks due to solar thermal stress, the crack usually starts at one of these "edge stress" points.

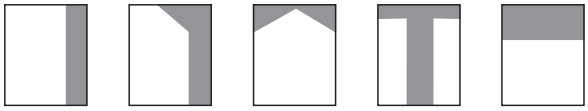
# CONDITIONS THAT INCREASE THE RISK OF GLASS BREAKAGE

Understanding potential glass breakage risks will lead to better window film application decisions. Installing window films is not recommended if the following conditions exist:

Up to 25% of the glass is shaded including more than 25% of the glass perimeter.

Shading patterns on a window can cause acceptable film-to-glass combinations to have a high risk of glass breakage.

SOME HARMFUL SHADING EXAMPLES



The information contained herein should not be taken as an offering of a warranty against glass breakage. This is for informational purposes only, to assist in your evaluation of glass breakage risk!

- IG Window in excess of 40 sq ft (3.75 sqm) in total.
- Any window in excess of 60 sq ft (5.6 sqm) in total.
- Glass with an edge dimension exceeding 10 feet.
- History of broken glass or seal failure.
- Framing sealant or gaskets that are no longer resilient.
- Concrete framing or framing that has no gasket or seals.
- Laminated glass (except clear safety films).
- More than one film applied to surface.
- Round, circular, textured, painted lettering or ornamentation, wired glass or skylights.
- Non pre-manufactured or frameless arched windows.
- Triple or quadruple pane IG units.
- Glass that is thicker than 1/4"(6mm).
- Dual pane windows with 1/4" (6mm) or thicker tinted glass.