



## Visual Inspection Standards for Applied Window Film

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The following is taken from the  
**International Window Film Association** at - <https://iwfa.com/research>



1. Installed film on flat glass surfaces is not expected to have the same level of visual quality as glass. The following criteria apply to the installed film only and not to any defect inherent in the glass.
2. Installed film has a discrete time for full adhesion to be effected since installation utilizes a detergent solution in the water to float the film onto the glass: the excess water is squeegeed out, but inevitably residual water will remain between the film and glass. The time to achieve full adhesion is often referred to as “the adhesive cure time”. Adhesion will be increasing from a lower value during this time. Visual and adhesive cure time is related to thickness of the film and various metallic coating on the film. Typical visual cure times may be extended or shortened according to climatic conditions.
3. Inspection for optical quality can be made before full visual cure is attained. Table 1 provides a guide for typical visual cure times. It should be noted that effects during cure, such as water bubbles, water distortion, and water haze are not to be regarded as defects.
4. The glass with applied film shall be viewed at right angles to the glass from the room side, at a distance of not less than 6 feet (2 meters), recommended distance is 10 - 12 feet. Viewing shall be carried out in natural daylight, not in direct sunlight, and shall assess the normal vision area with the exception of a 2 inch (50mm) wide band around the perimeter of the unit.
5. The installation shall be deemed acceptable if all of the following are unobtrusive (effects during visual cure should be disregarded): Dirt Particles, Hair and Fibers, Adhesive Gels, Fingerprints, Air Bubbles, Water Haze, Scores and Scratches, Film Distortion, Creases, Edge Lift, Nicks and Tears. Inspection may be made within 1 day of installation. Obtrusiveness of blemishes shall be judged by looking through the film installation under lighting conditions described in 4.
6. The 2 inch (50mm) wide band around the perimeter shall be assessed by a similar procedure to that in 3 and 4, but a small number of particles is considered acceptable where poor frame condition mitigates against the high quality standards normally achieved.
7. Edge gaps will normally be 1/32 – 1/16 inch (1-4mm). This allows for the water used in the installation to be squeegeed out. This ensures that film edges are not raised up by contact with the frame margin. Contact with the frame margin could lead to peeling of the film. Climates with large temperature differences (more than 50 degrees Celsius) between summer and winter call for a larger edge gap of between 1/6” to 1/8”. This will prevent edge lift do to expansion and contraction of the window frame and glass.

8. For thicker safety films the edge gaps will normally be 1/32 – 1/16 inch (1-4mm), with 1/32 – 1/8 inch (1-5mm) being acceptable for films of (7 mil (175)). Combination solar control safety films will also fall within this standard. An edge gap of up to 1/16 inch (2mm) is recommended, especially for darker (tinted, metallized, tinted/metallized, and sputtered) films, to minimize the light line around the edge of the installed film. Climates with large temperature differences (more than 50 degrees Celsius) between summer and winter call for a larger edge gap of between 1/6” to 1/8”. This will prevent edge lift do to expansion and contraction of the window frame and glass.

9. Splicing of films is necessary when larger panels of glass are treated, where both length and width of the glass exceed the maximum width of film. The splice line itself should not be viewed as a defect. This line should be straight and should be parallel to one edge of the frame margin. The two pieces of film may be butt jointed. The maximum gap at any point in the splice line should be 1/64 inch (1mm). Film may be overlapped, spliced or butt jointed.

10. Certain films with special high performance coating may have lengthened cure times. Consult the manufacturer for cure times of these films. Cure times will vary on environmental conditions. Below is a general guide.

### **Table 1: Typical Cure Times**

Film thickness in mils Film thickness in microns( $\mu$ ) Typical Cure Time (days)

- Up to 4mil or Up to 100 microns: 30 to 60 days. Most sun control, graphic and safety products fall under this category.
- 4 - 8 mil or 100 - 200 microns: 60 to 90 days. Most safety and security products.
- 8 - 12 mil or 200 - 300 microns: 90 to 110 days. Most security products.
- Over 12mil but not more than 17mil Over 300 microns but not more than 425 microns: 120 to 200 days. Specialized security products.

\*Special adaptation of information received from the Glass and Glazing Federation; reproduced with their permission.

### **Bullet Resistance Statement:**

Our industry believes there are adequate and acceptable standards and methods for testing of products as protection against ballistics. Since window films are an addition to a glazing and not intended for use as the glazing itself, we firmly believe that an individual glazing should be tested both with and without film installed on it for any comparison of improvement in total performance.

In some cases, we have seen demonstrations or claims that the use of film imparted some bullet resistant value when, in fact, the glazing itself without film had almost those same bullet resistant qualities. Extreme caution should be taken, however, to make sure that any claims about performance due to the addition of a film layer clearly state the specifics of the glazing itself as supplied by the glazing manufacturer, the specifics of the film itself as supplied by the film manufacturer, and all relevant specifics of the ballistics used and the conditions of the test.

Any attempt to imply performance due to the application of the film under any other conditions (different manufacturer, different glazing, different ballistics, different conditions), we believe, would be irresponsible as the margin for error could be one of life safety.