

# 3M Technical News

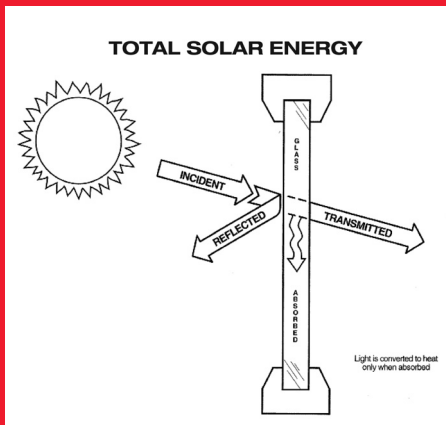
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## Why does glass get hot?

*Does that mean my house is hotter with the window film installed?*

Window film helps to reject the sun's energy by either absorbing or reflecting the solar radiation. Reflection is the most efficient heat rejection mechanism but it is typically difficult to reflect the infrared heat without also giving a mirror-like appearance to the film, i.e. reflecting the visible light as well. Absorption technology minimizes the shiny appearance of the film, but in doing so it usually causes the film to heat up. This heat is then re-radiated either back outside or into the house.

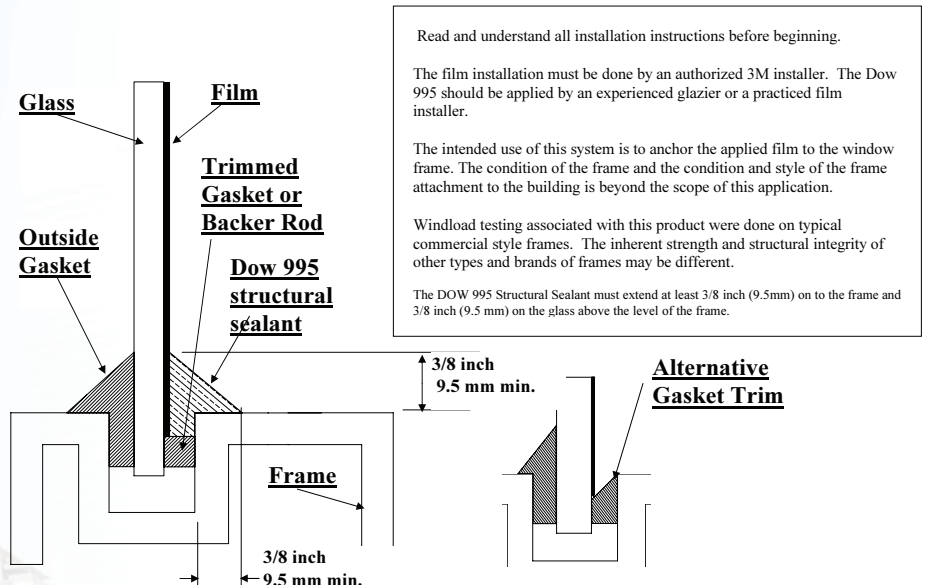


If you apply a window film and notice that the temperature of the window is now hotter than before, this does not mean that your building is hotter. In fact you are observing the exact opposite. The solar energy is now being absorbed at the film and only a portion of it continues on into your house. Without film, this same energy goes right through the glass and into your house.

## Ultraflex Sealant System for Factory Mutual Compliance

The following are the only official 3M drawings that describe the requirements for the application of 3M Ultraflex. These drawings cover the application of Dow995 as part of the Ultraflex system for Factory Mutual requirements and Blast mitigation. The FM requirement is  $\frac{3}{8}$  inch of 995 on the film and  $\frac{3}{8}$  inch 995 on the window frame. The blast mitigation requirement is  $\frac{1}{2}$  inch on the film and  $\frac{1}{2}$  inch on the frame. In both cases, the requirement of 995 on the frame does NOT include any gasket that may be present. The  $\frac{1}{2}$  inch or  $\frac{3}{8}$  inch measurement begins where the gasket ends (refer to the drawings).

In addition, all jobs requiring approvals and submissions to FM must include the attached FM referenced drawing, which will be compared to the drawings on file at FM and 3M.



**Notice: This drawing supersedes all previous Factory Mutual Compliance drawings**

**3M™ Ultraflex Sealant System  
For Factory Mutual Compliance**

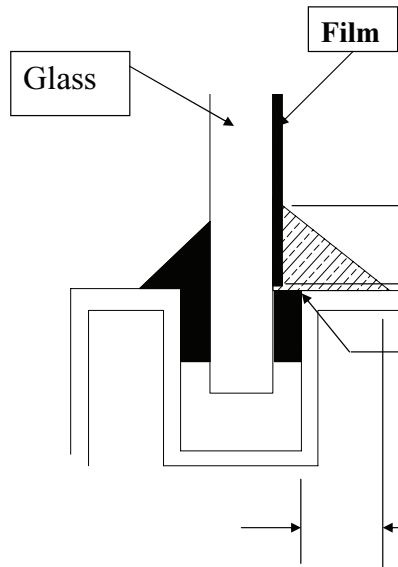
Drawing No. BSSD-USS-003  
3M Building Safety Solutions  
Department

Revision Date: 10/31/05

Revision  
**A**

Continued on page 2

Ultraflex (continued from page 2)



Read and understand all installation instructions before beginning.

The film installation must be installed by an authorized 3M installer. The Dow 995 should be applied by an experienced glazier or a practiced film installer.

The intended use of this system is to anchor the applied film to the window frame. The condition of the frame and the condition and style of the frame attachment to the building is beyond the scope of this application.

Explosive blast testing associated with this product was done on typical commercial style frames. The inherent strength and structural integrity of other types and brands of frames may be different.

For blast applications the Silicon adhesive must extend at least 1/2 inch on to the frame and 1/2 inch on the glass above the level of the frame Refer to the attached instruction sheet for details.

Dow 995 1/2" min on film for blast mitigation

Inside gasket trimmed flush with frame

Dow 995 1/2" (excluding gasket), for blast mitigation

<b>3M™ Ultraflex Sealant System</b> <b>Typical Configuration for Blast Mitigation</b>	Drawing No. SCPD-USS-002 3M Building Safety Solutions Dept.	Revision <b>J</b>
	Revision Date: 10/31/05	

*Official drawings can be obtained by contacting the BSSD Technical Services Department.*

# Black Chrome Automotive Window Film

3M™ Black Chrome Automotive Window Film is our line of metallic automotive window films that not only enhance your vehicle's appearance but offer EXCELLENT heat rejection, glare control, privacy, and protection from the damaging effects of the sun. 3M™ Black Chrome Automotive Window Film comes with a limited lifetime warranty not to peel, bubble, blister, fade, or discolor. All this from a company you know and trust.

	Heat Reduction	UVA and UVB Protection	Warranty Period	Reflection	Color Stability	Color Guarantee	Actual Color	Metalized
FX-ST	★★★	★★★★★	3 Years	5%	Low	No	Charcoal	No
FX-HP	★★★★	★★★★★	Lifetime	9%	Med	No	Charcoal	Yes
Black Chrome	★★★★	★★★★★	Lifetime	18%	High	Lifetime	Charcoal	Yes
Color-Stable	★★★★	★★★★★	Lifetime	5%	High	Lifetime	Black	No

Product	Description	3M ID Number	UPC Number	Part Number
BC-10	20" x 100'	70-0063-4461-1	000-51131-90526-9	PN90526
BC-10	40" x 100'	70-0063-4462-9	000-51131-90527-6	PN90527
BC-10	60" x 100'	70-0063-4463-7	000-51131-90528-3	PN90528
BC-20	20" x 100'	70-0063-4464-5	000-51131-90529-0	PN90529
BC-20	40" x 100'	70-0063-4465-2	000-51131-90530-6	PN90530
BC-20	60" x 100'	70-0063-4466-0	000-51131-90531-3	PN90531
BC-35	20" x 100'	70-0063-4467-8	000-51131-90532-0	PN90532
BC-35	40" x 100'	70-0063-4468-6	000-51131-90533-7	PN90533
BC-35	60" x 100'	70-0063-4469-4	000-51131-90534-4	PN90534
BC-40	20" x 100'	70-0063-4470-2	000-51131-90535-1	PN90535
BC-40	40" x 100'	70-0063-4471-0	000-51131-90536-8	PN90536
BC-40	60" x 100'	70-0063-4472-8	000-51131-90537-5	PN90537

3M Building Safety Solutions Department  
 3M Center, Building 223-2S-24  
 St. Paul, MN 55144

## The use of Dow Corning 995 Silicone Structural Adhesive for Film Attachment

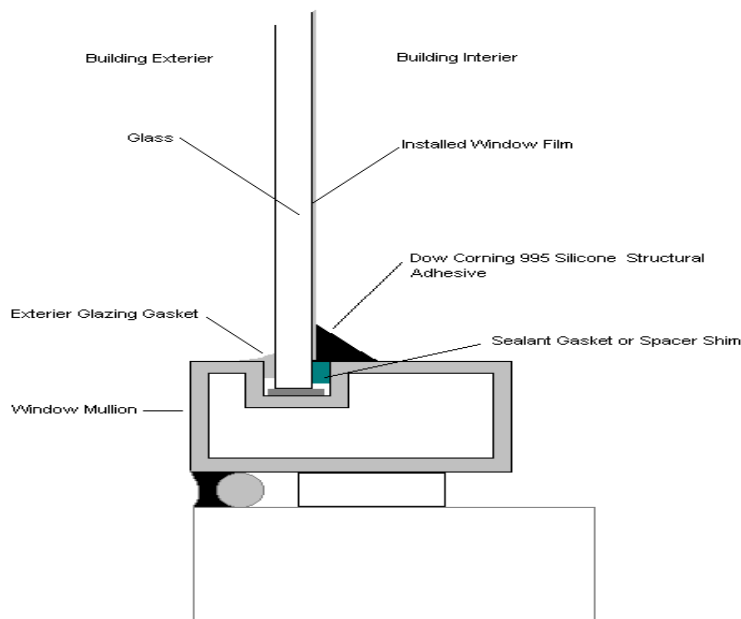
Window glass performs a vital function in buildings; however, the nature of glass creates certain hazards. These hazards include, the potential spontaneous breakage of tempered glass, flying glass that can cause injury during a severe storm like a hurricane or tornado. A bombing like the Alfred P. Murrah federal building in Oklahoma City can cause glass breakage for many blocks. Broken lites falling out of buildings could harm people on the ground this could occur when a cracked piece of glass works it's way out of an opening. Other issues related to glass are security concerns relating to storefront windows.

In each of these areas, there are two underlying needs; first, to hold the glass together keeping the shards from flying and second to keep the glass attached to the frame. These needs are met by a combination of an applied window film which holds the glass lite together preventing flying shards and an attachment system which must hold the lite into the supporting frame. Systems designed using Dow Corning 995 silicone structural adhesive to anchor an applied polyester film onto a supporting frame have proven to be some of the most effective techniques for protecting people from the hazards of glass.

Each of the applications referred to above have slightly different needs and requirements therefore any system that is used needs to be evaluated for the specific requirements and must only be used as tested. Performance depends upon the flexibility of the entire system as well as the strength of the entire system. (Including the film, sealant and frame) Therefore, the sealant joint cannot be designed without a through understanding of the strength and flexibility of the entire window film system. A joint that performs well with one type of window film may not perform as well with a different type of film.

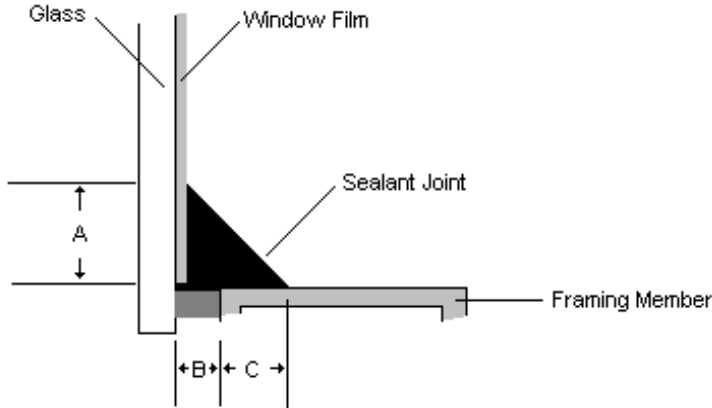
The sealant attachment systems, which have proven to be economically viable, are built around a triangular joint connecting the film onto the supporting framing member. To achieve acceptable performance a very high performance sealant must be used. The purpose of this tech talk is to document some of the key parameters that have been shown to be critical for the application as well as providing examples of application issues that could affect system performance.

Figure 1 is a generic view of this application using a triangular bead of Dow Corning 995 silicone structural adhesive.



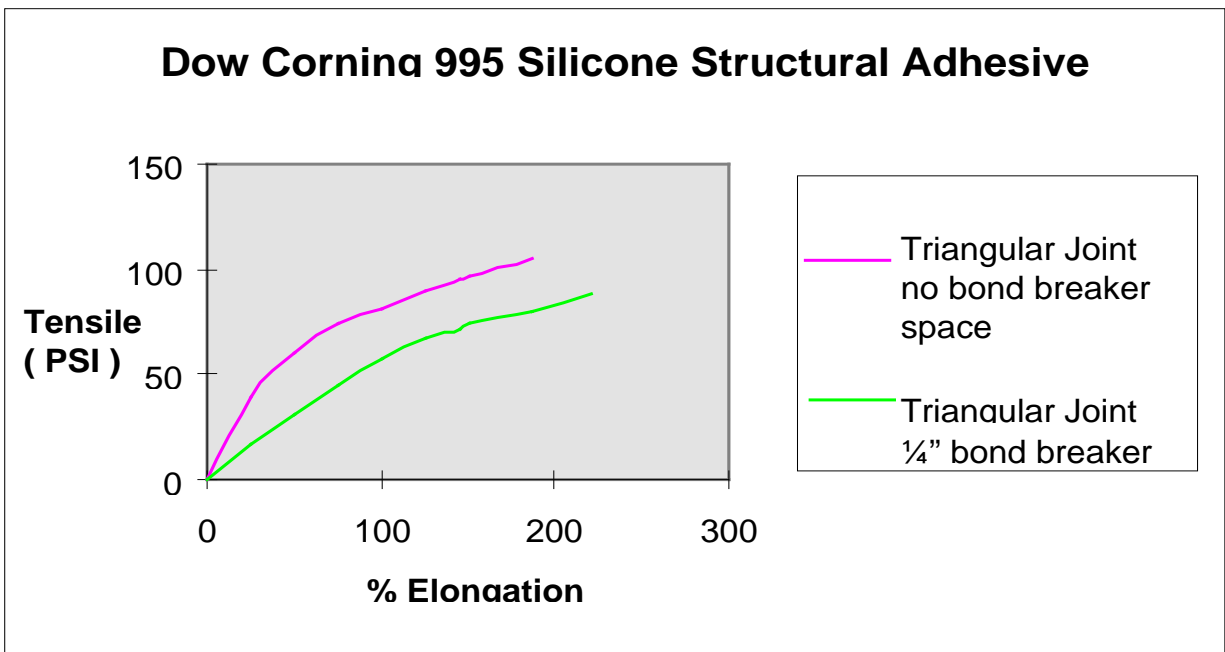
Looking specifically at the sealant joint geometry there are several areas that are important to consider and control. Figure 2 illustrates a triangular sealant joint.

Figure 2. Sealant joint



A: The sealant bite onto the attached film. To assure sealant adhesion and application a minimum sealant bite of  $\frac{1}{4}$  inch is required for any sealant cap beading application. Many high performance applications designed to withstand an applied force are built around a sealant bite of  $\frac{1}{2}$  ' which has proven to perform well in a variety of application tests.

B: Gasket or glazing channel interior thickness. This is the distance between the inside of the glass to the framing member. Generally, this distance is approximately  $\frac{1}{4}$ " depending upon the type of glazing system. Increasing this distance will generally increase the flexibility of the joint and decrease the joint ultimate strength. The performance of two joints (dimension's A and C =  $\frac{1}{2}$ "') one with a Gap of 0.0" and a second with a gap of  $\frac{1}{4}$ " is documented in figure 3 (pulled to failure at a rate of 2" per minute.)



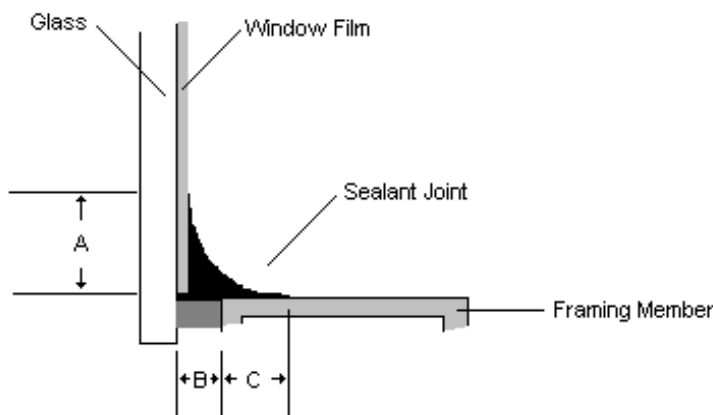
C: Sealant bite onto the framing member. To assure sealant adhesion and application a minimum sealant bite of  $\frac{1}{4}$  inch is required for any sealant cap beading application. Many high performance applications designed to withstand an applied force are built around a sealant bite of up to  $\frac{1}{2}$  ' which has proven to perform well in a variety of application tests.

Since the requirements for any application is specific to that application it is critical to assure that the system to be installed has been tested as a whole. Including the sealant joint shapes and contact dimensions referenced above.

### Potential areas of concern

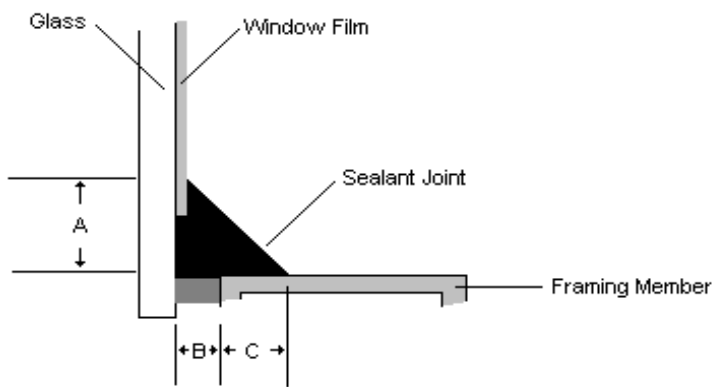
There are several areas of concern relating to the way that a triangular joint could be applied resulting in reduced performance some areas of concern are as follows:

Figure 4: Concave Joint Surface:



In this joint, the sealant is tooled with a concave surface, which would affect the strength and performance of the joint.

Figure 5. Film not taken to edge of daylight opening.



In this illustration the window film is not installed to the edge of the daylight opening therefore the sealant contact with the film is minimal and joint performance will be reduced accordingly.

Figure 6. Installation of the silicone structural adhesive joint over an existing internal gasket without any cutback resulting in a reduction of sealant bond to the framing member.

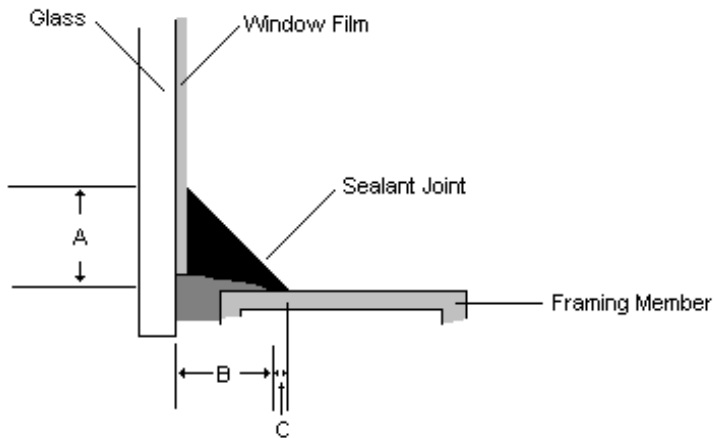
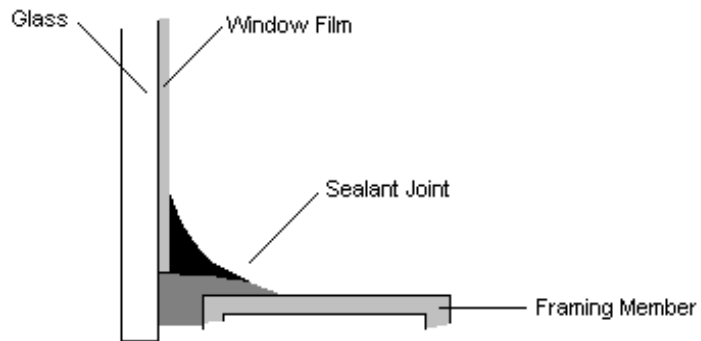


Figure 7: In this illustration, the sealant was actually taken to a gasket that was not removed, and the joint was tooled concave.



In this application, the sealant is only contacting a gasket. This would be clearly unacceptable because 1) sealants often do not adhere to gasket material. 2) The gasket may not be designed to support load.