



To Help Keep Danger Out
Bring 3M In

3M Window Film

How it Works



<https://www.youtube.com/watch?v=z1LK2IMjprQ>

Outline

- Problem Definition
- Overview of Safety and Security Films
- Film Features / Attributes
- Attachment Systems
- Discussion / Next Steps

Safety films hold broken glass and increase penetration resistance

Film Benefits During Glass Break

- Holds glass in the frame once a break occurs
 - Helps reduce the risk of injury from shards, or glass falling from the frame
- Increases the glass' penetration resistance to:
 - Debris
 - Attack



Mode of Entry into Schools

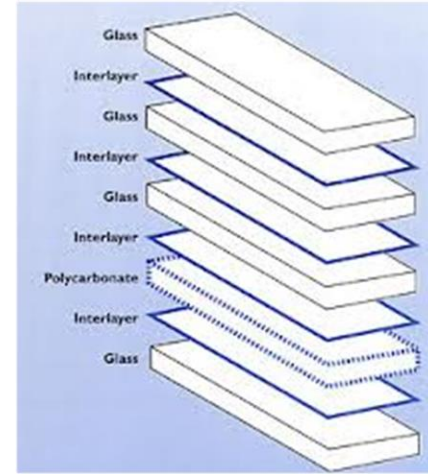
- Many schools have locked doors during operation
- Weak point is glass
- Most schools do not have bullet resistant glazing or even laminated glass, just tempered glass
- Shooter can easily get through glass with single shot



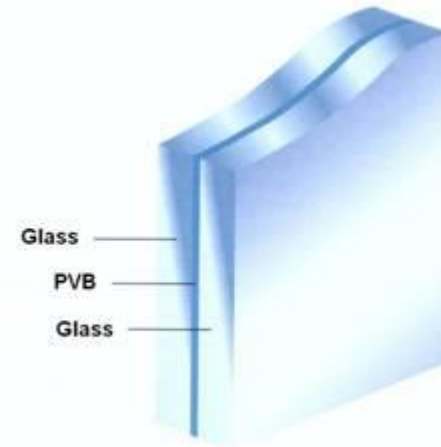
Fortifying Glass in Schools



- Options
 - Bullet Resistant Glass
 - Laminated Glass
 - Costly
- Safety and Security Film with an attachment system
 - Cost effective
 - Easily applied and uses existing glazing
 - Only a deterrent to help buy precious time to get to safety and to respond
 - Optically clear film catches intruder off guard when attempting to break glass



BRG



Laminated Glass

Safety & Security Window Films



Deterring Smash-n-Grab / Break & Entry



Blast Mitigation



Windstorm Protection



Seismic Preparedness



Safety Glazing / Human Impact Safety



Spontaneous Glass Breakage

Safety and Security films are widely used in a variety of applications

How S&S Films Work

- Film + strong adhesive forms a protective membrane on the glass
- Film is applied on interior side
 - Opposite attack face
 - Protected from elements
- Does not prevent glass from breaking, but holds broken glass fragments together
- Film attachment systems applied along perimeter to anchor the film to the window frame
 - Forces intruder to create opening through center of broken glass



Film Properties

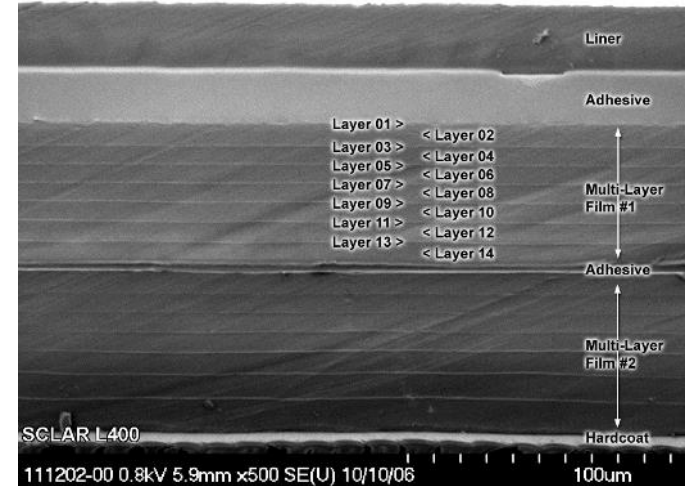
- Tear Resistance

- Offered only by 3M™ Ultra Safety and Security Window Films

- 3M Patented micro-layered technology

- Ultimate combination of tear-resistance, flexibility, energy absorption, and ease of installation

- 3M window films are in compliance with the ANSI Z 97.1 2015



3M™ Ultra S800

- Our thickest tear resistant film (8 mils, 0.008")
- Micro-layered
- Optically clear
- Tear resistance inhibits & deters expansion of opening for body passage

3M™ Scotchshield™ Safety and Security Window Film Ultra S800

Technical Data

Product Features & Benefits

- Micro-layered film designed for tear resistance
- Optically clear
- Applies to interior glass surfaces
- Helps protect from broken glass hazards
- Helps protect against damaging effects of UV light

Suggested Applications

- Bomb Blast Mitigation
- Deterring Break and Entry
- Safety Glazing
- Spontaneous Glass Breakage
- Seismic Preparedness

Performance Testing*

Method	Glass Substrate	Film Attachment	Rating	
Safety Glazing / Impact Resistance				
16 CFR 1201	1/2" & 1/8" annealed	--	Category 2, 400 ft-lbs	
ANSI Z97.1			Class A (Unlimited), 400 ft-lbs	
Missile Impact and Pressure Cycling				
ASTM E1886 / E1996	1/2" tempered	IPA	Large Missile C, +/- 75 psf	
ASTM E330	3/16" tempered		+/- 100 psf	
Blast Mitigation			Blast Load	Rating
GSA TS01-2003 / ASTM F1642	1/2" annealed	IPA	6 psi, 42 psi/msec	GSA Level 2 / ASTM "Minimal Hazard"
		IPP	7 psi, 42 psi/msec	GSA Level 2 / ASTM "Minimal Hazard"
	1/2" tempered	IPA	6 psi, 42 psi/msec	GSA Level 2 / ASTM "No Hazard"
		IPP	7 psi, 42 psi/msec	GSA Level 2 / ASTM "Minimal Hazard"
	1" double pane (annealed)	IPA	10 psi, 80 psi/msec	GSA Level 2 / ASTM "No Hazard"
		IPP	9 psi, 60 psi/msec	GSA Level 2 / ASTM "Minimal Hazard"

Film Properties* (nominal)

Film Thickness	8 mils	Graves Area Tear Resistance (ASTM D1004)	1,200 lbs/ft
Film Construction	Micro-layered	Puncture-Propagation-Tear Resistance (ASTM D2582)	9.5 lbf
Tensile Properties (ASTM D882)		Puncture Strength (ASTM D4830)	185 lbf
Tensile Strength	27,000 psi	Abrasion Resistance (ASTM D1044)	3% Δ haze
Break Strength	215 lbs/in	Peel Strength (ASTM D3330)	6.1 lbs/in
Elongation at Break	95%	Flammability (ASTM E84)	Class A
Yield Strength	15,000 psi	Solar Properties – film applied to 1/4" clear glass	
Elongation at Yield	8%	Visible Light Transmitted	87%
Modulus	575 kpsi	UV Light Rejected	99.9%

*not for specification purposes

Attachment Systems

- Window Film and Attachment System help contain filmed broken glass in the window frame
- Creates bond between film and frame to anchor the glazing system
- Types:
 - 3M™ Impact Protection Adhesive
 - structural sealant wet-glaze
 - 3M™ Impact Protection Profile
 - flexible-mechanical attachment with VHB structural glazing tape

- Attachment systems always enhance protection
- Mandatory on tempered glass



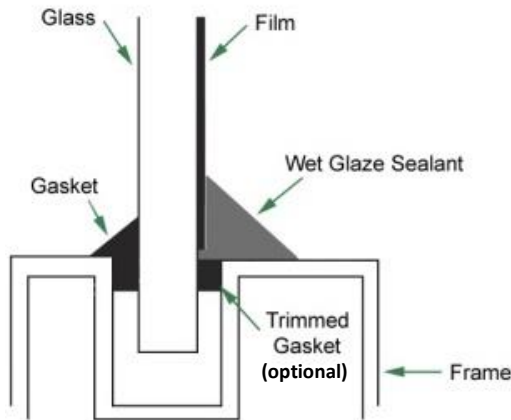
Forces intruder to pass through hazardous shards of glass

Impact Protection Adhesive



3M™ Impact Protection Adhesive

- Wet glaze structural sealant
- Low odor / VOC
- Fast cure time
- Weatherable & paintable
- Matte finish (vs. glossy)



Impact Protection Adhesive

- ~ 3 days cure time
- More “tamper resistant”
 - Advantageous in school environment
- At least ¼” coverage on film and frame (not including gasket)
 - **Minimum 3/8” coverage recommended**

IPA is recommended in schools



Security/Sun Control for **SCHOOLS**

Example School: Typical Entrance

3M Ultra Prestige 70 Window Film
or

3M Ultra S800 Window Film



Example School: Typical Classroom Door

3M Ultra S800 Window Film



Summary

- The Scenario we're trying to address...
 - To SLOW DOWN a single intruder with firearm as their only (primary) device
 - Unprepared for strengthened glass. Cannot pass through bullet hole, must create and expand opening large enough for body passage.
 - Minimize Flying Glass
- Security Films and Attachment Systems are quick and cost effective way to fortify existing glazing
 - Easy to implement, utilize existing glazing
 - Not bullet proof or impenetrable, but can buy precious time for occupants to respond
- Recommended 3M Products
 - Ultra S800– thickest film for most vulnerable areas
 - Impact Protection Attachment – essential for slowing down the intruder
 - Impact Protection Adhesive

Energy- Saving Window Films

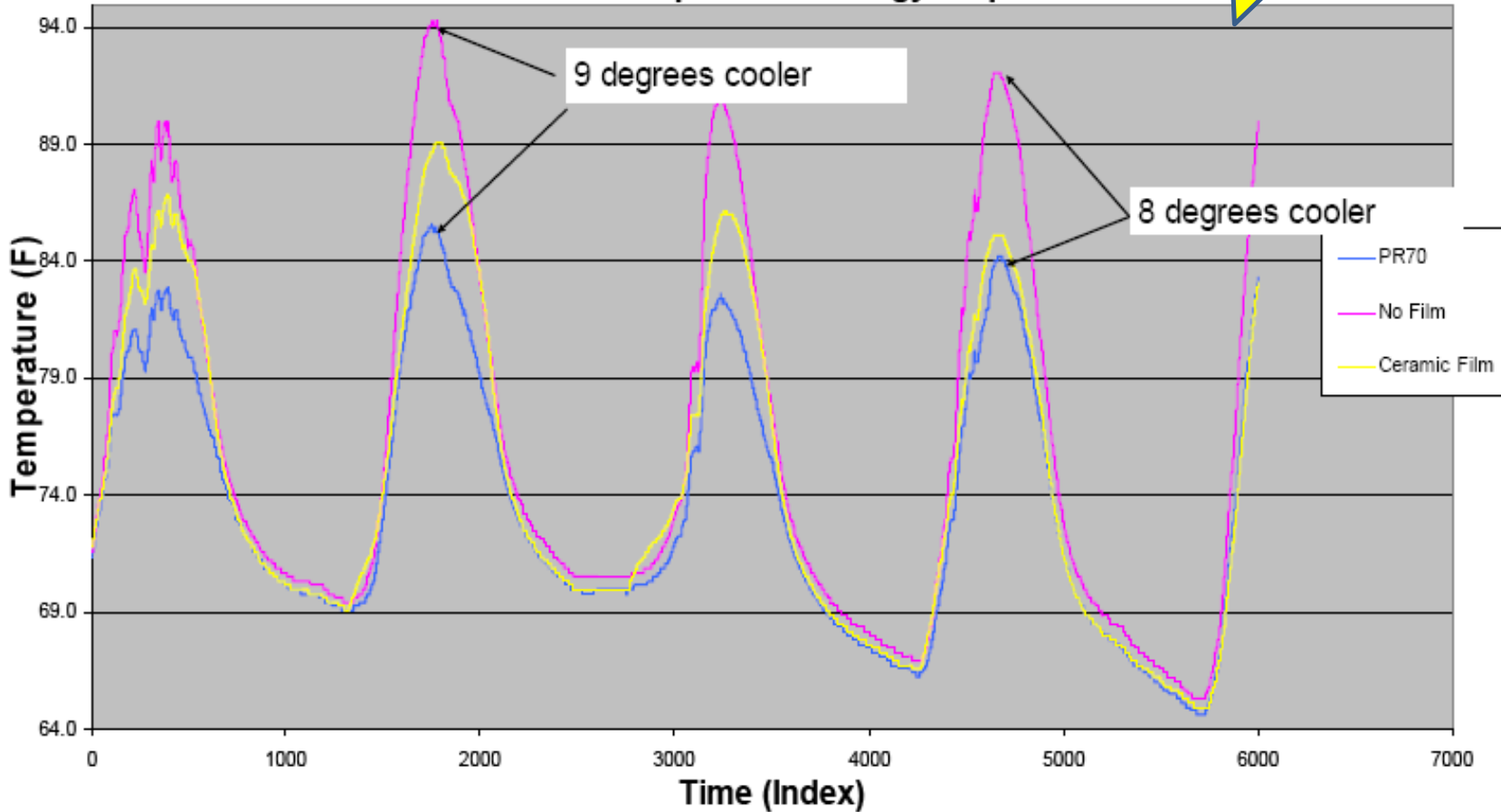


- Reduce utility bills 2%-10%
- Reduce temperatures 5°- 10°F
- Average ROI is 3-6 Years
- Receive 2-11 LEED points
- Improve E* Portfolio Manager Score
- Ultra-Prestige Film

Temperature Logger

9°F
Reduction

PR70 Room Shaves peak A/C Energy Requirements



Warranty Information

- Warranties require proper care and maintenance of film
- Commercial warranties are generally 10+ years
- There are many examples of projects where window films have lasted well over 20 years



Warranty Information

3M™ Safety & Security Window Film Warranty **US Commercial Limited 10 Year Product Warranty**

Warranty ID#

Product Warranty, Limited Remedy and Disclaimer:

3M Company and the 3M Authorized Window Film Dealer (collectively referred to as "Seller") warrant for Ten (10) Years from installation, and provided that the product is maintained in accordance with the Window Care Instructions below, that the 3M Safety & Security Window Film will:

- Maintain **Solar Reflective Properties** without cracking, crazing, or peeling
- Maintain **Adhesion Properties** without blistering, bubbling, or delaminating from the glass
- Maintain **Appearance** without discoloration
- Maintain **Strength, Tear, and Penetration Resistant Properties** as defined in product literature.

Warranty Applicable with additional purchase & installation of 3M™ Impact Protection System Adhesive or Profile:

With the purchase of 3M Impact Protection Profile or 3M Impact Protection Adhesive on all four (4) sides of the window, for the entire project, 3M Company and the 3M Authorized Window Film Dealer agree to extend the terms of this warranty an additional two (2) years, for a total of a twelve (12) year warranty. This includes the film, attachment system, and labor. No changes are made to the glass breakage warranty.

The 3M Impact Protection System Adhesive or Profile warranty applies to new 3M Safety & Security Window Film installations. The adhesive or profile Product will meet 3M Product specifications in effect at time of installation. The warranty period is ten (10) years from the date of installation for a two sided application, and twelve (12) years for a 4 sided application. This shall not cover failure due to disintegration of the underlying substrate, movement of the structure exceeding specification for elongation and/or compression, changes in appearance of the adhesive due to dirt or other contaminants, tampering or other modifications applied after installation. Film warranty is void if the 3M attachment system is removed for reasons other than to replace product found defective under this warranty. **Application of NON-3M wet glaze attachment system voids 3M Safety & Security Film Warranty**

If the 3M product does not conform to this warranty, the sole and exclusive remedy is:

- Replacement of the **Quantity of Film** proved to be defective; and
- Provide **Removal and Reapplication Labor of like quality Product free of charge**

Seller also warrants against **glass failure** due to thermal shock fracture, (maximum value of \$500 per window) caused only as a direct result of the application of 3M Safety & Security Window Film provided the film is applied to recommended types of glass and the glass failure is reported to the Seller within the specified time (listed below) from the start of the installation. Glass breakage coverage is only valid for 3M Solar & Safety & Security Window Films.

- Sixty (60) months coverage against thermal shock fracture
- Any glass failure covered by this warranty must be reviewed by Seller prior to repair, and only covers film and glass replacement.

This warranty is only to the original purchaser of the Product(s) from Seller, is not transferable and is further subject to the terms and conditions set forth herein. 3M MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY OR CONDITION ARISING OUT OF A COURSE OF DEALING, CUSTOM OR USAGE OF TRADE. Except where prohibited by law, 3M will not be liable for any loss or damage arising from the 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability.

The Product Warranty applies only when Product is maintained in accordance with Window Care Instructions, when the Product is properly installed. This Product Warranty does not cover misuse, abuse or acts of God. **This Product**

Warranty covers U.S. Installations only.

Claims Process:

To obtain warranty service, please contact your 3M Authorized Window Film Dealer at:

Important Notice: Window Care Instructions

3M Safety & Security Window Films may be washed with common washing solutions, including ammonia-based products, **thirty (30) days after installation**. Abrasive type cleaning agents and bristle brushes which would scratch the film must not be used. Synthetic sponges, squeegees, or soft cloths are recommended to be used with the cleaning solution. **To maintain your warranty, do not use tape or other adhesive products on the film.**

Important Notice: Temporary Appearance:

After installation, there may be a hazy appearance on your windows. This condition is temporary and is caused by the moisture that is present when applying the film. This hazy appearance will disappear after the film dries which may take up to thirty (30) days for the



Care & Maintenance

- Wash 30 days after installation
- Use common window cleaning solution
- Use synthetic sponges or soft cloths
- Use a soft squeegee
- Never use bristle brushes



FOLLOW-UP

To learn more or request a free site survey
please contact

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Or

Jim Passage at 716-316-7970

jppassage@mmm.com

Thank You

3M Innovation