

Llumar: Protective window film

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WHEN IT
COMES TO
PROTECTION,
THE CHOICE
IS CLEAR.

WINDBORNE
DEBRIS



BOMB
BLAST



ACCIDENTAL
BREAKAGE



FORCED
ENTRY



GRAFFITI



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South African building products and suppliers

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LLumar puts a fine line between you and disaster.
And that's a good thing.



Oppressive heat and 20,000 panes of glass made Bangkok's Empire Tower a high risk for spontaneous breakage. To ensure the safety of tenants and passersby, 592,000 square feet (55,000 m²) of LLumar was installed.

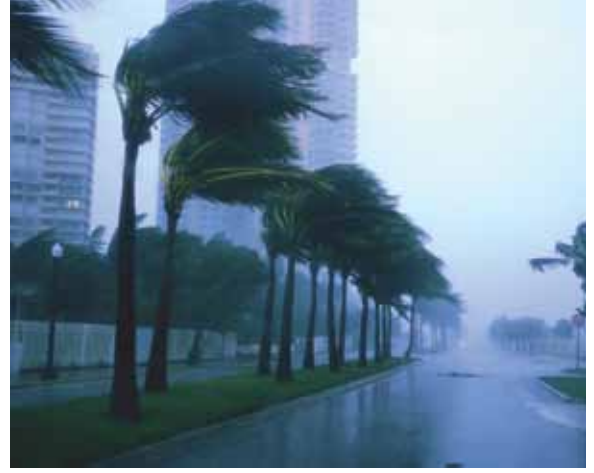
Storms, earthquakes, explosions, vandalism. Both natural and man-made disasters are on the rise worldwide. Whether the threat comes from graffiti taggers, smash-and-grab thieves, terrorist bombs or violent storms, the consequences to people and property can range from unsightly to costly to deadly. Help protect all your precious resources — human as well as financial — with LLumar Protective Window Film.

Made of a clear, heavy-duty polyester compound, LLumar provides a thin, transparent barrier against these threats. Installed with the industry's leading attachment systems, LLumar securely adheres to glass surfaces to resist impact and help keep particles safely in place if glass is broken. Durable and easy to install, LLumar provides a simple, cost-effective alternative to new safety glazing. And unlike obstructive physical barriers like bars, shutters or grates, LLumar is virtually invisible, offering 24/7 protection for your views and design, as well as your property.



**Danger is ever-present.
With LLumar, protection is, too.**

- Over 80% of injuries in the 1996 bombing of a U.S. Air Force base in Saudi Arabia were due to broken and flying glass.
- U.S. losses from hurricanes and tornadoes total \$6 billion per year.
- Long-range predictions by U.S. government forecasting agencies suggest a probable increase in severe weather.
- The Florida Retailers Association estimates that "smash and grab" robberies cost \$26,000 to \$100,000 per incident.
- One-third of all illegal entries occur through broken windows.
- Graffiti damage costs Americans an estimated \$25 billion annually.
- Spontaneous breakage forced architects of Boston's John Hancock Tower to replace every window in the building, costing the firm over \$5 million.

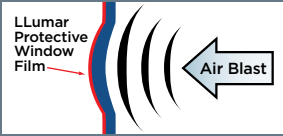
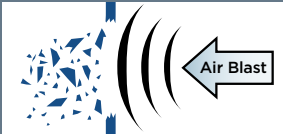


WINDBORNE DEBRIS

A transparent but powerful barrier, LLumar Protective Window Film maintains the window's weather seal to help protect structures from high winds and pressure variables that can destroy a building and its contents.



The Hyatt Regency San Antonio boasts a 16-story lush garden atrium rising over a cascading waterway, creating a Texas-sized welcome for guests. Concerned about security as well as potential for severe weather in the region, Hyatt management had 17,500 square feet (1,626 m²) of LLumar protective film installed.



BOMB BLAST

When windows are shattered by an explosion, most of the damage, injuries and deaths are caused by flying glass. By holding shattered glass in place, LLumar can help mitigate this damage.

Architects and managers trust LLumar to secure such treasured buildings and artifacts as the Vatican, Buckingham Palace, the U.S. Constitution, and hundreds of embassies and other official government facilities throughout the world.



ACCIDENTAL BREAKAGE

When accidents or spontaneous breakage occur, shattered glass fragments pose great risk of personal injury. LLumar Protective Window Film helps hold glass fragments in place until they can safely be removed and replaced.



Glass walls and balustrades lent an open feel to South Korea's Incheon International Airport, but were vulnerable to breakage by baggage carts and heavy traffic. LLumar Protective Window Film keeps the space bright and open while keeping airport employees, passengers and property safe.



FORCED ENTRY

In addition to the loss of merchandise, smash-and-grab theft can cost retailers thousands of dollars in damage to windows and furnishings. LLumar Protective Window Film deters forced entry by making windows harder to penetrate, encouraging would-be intruders to seek easier targets. And unlike bars or grates, LLumar doesn't block product displays, so you can deter thieves without discouraging customers.





GRAFFITI

While LLumar anti-graffiti film won't prevent taggers from leaving their mark, it does help prevent permanent damage. LLumar provides a transparent barrier on windows, mirrors or other vulnerable surfaces. When vandals strike, simply peel away the film — and the graffiti with it.



Historic transportation shelters in the seaside town of Herne Bay, UK, were plagued by vandals. The installation of LLumar anti-graffiti film keeps these beloved structures neat and appealing to both residents and tourists.



ENERGY EFFICIENCY

LLumar Protective Window Film can help save on energy costs by adding heat rejection properties to windows.

Fearless design demands flawless security.



Glass provides countless options for creating inviting and useful work and living spaces. But it can also expose you to great risk. Windows are the most vulnerable part of any building's envelope. Providing easy points of entry for vandals and thieves, windows become dangerous shards when broken.

Keep an eye on security without losing sight of your design or budget. LLumar Protective Window Film provides reliable, affordable protection for a variety of applications, including commercial, residential, mass transit, and government facilities throughout the world. LLumar is also ideal for unique applications such as glass spider walls, display cases, balcony closures, and shower doors.

While you can't always predict disaster, you can prepare for it. LLumar Protective Window Film stands guard around the clock to protect your people and property from the dangers you expect, and the ones you don't.



LLumar meets the tests of man and nature.

Verified by independent laboratories in accordance with accepted testing methods, LLumar meets criteria established by the industry's most respected organizations, including ANSI, General Services Administration, Underwriters Laboratory, and current European standards. In short, when put to the test, LLumar performs.

- ANSI Z97.1 and CP SC 16 CFR 1201 Cat I and II
- General Services Administration (GSA-TS01-2003) and United Facilities Criteria (UFC 4-010-01)
- ASTM Large Missile Level C and Small Missile Level A (ASTM E 1886/1996)
- Underwriters Laboratory UL972 Burglary-Resistant Glazing
- Factory Mutual FM Approvals 4350 Small Missile
- EN356, level P2A
- EN ISO 1518
- EN 12600

Secure your property with LLumar.

Professionally installed with minimal disruption, LLumar Protective Window Film is an affordable alternative to safety glazing, making it the ideal security solution for retrofit projects as well as new construction. Offering enhanced heat rejection, LLumar can help save on energy costs, too.

Manufactured by ISO-9001 certified Solutia Inc., LLumar is available in a range of thicknesses to meet virtually any project need. And the patented scratch-resistant coating is easy to maintain.

For additional specifications and performance information, case studies, or to find an authorized dealer near you, visit www.llumar.com.



Protective Film Physical Properties

	SCL SR PS2	SCL SR PS4	SCL SR PS6	SCL SR PS7	SCL SR PS8
FILM THICKNESS INCHES	0.002	0.004	0.006	0.007	0.008
APPEARANCE	Clear	Clear	Clear	Clear	Clear
FILM STRUCTURE	Single	Single	Multi	Single	Multi
TENSILE STRENGTH AS CONSTRUCTED	28,000	34,555	28,900	31,050	31,071
TENSILE STRENGTH AVERAGE AS REPORTED	32,000	32,000	32,000	32,000	32,000
BREAK STRENGTH PEAK LOAD	56	135	181	230	266
BREAK STRENGTH AVERAGE LOAD	56	133	173	211	254
ELONGATION AT BREAK	> 100%	> 100%	> 100%	> 100%	> 100%
PEEL STRENGTH	>2720 (>6)	>2720 (>6)	>2720 (>6)	>2720 (>6)	>2720 (>6)
PUNCTURE STRENGTH	45	70	111	145	156



Testing Performance Summary

Film-to-glass Specification			Safety			Windborne Debris Protection								Blast Mitigation					Security
1/8" Annealed	3 mm	LLumar 4 mil	•	•	•														
3/16" Tempered	5 mm	LLumar 6 mil	•	•	•	①	①	①	①	①		①							
1/8" Annealed	3 mm	LLumar 7 mil	•	•	•														
1/4" Annealed	6 mm	LLumar 7 mil	•	•	•										•				
3/16" Tempered	5 mm	LLumar 8 mil	•	•	•	①	①	①	①	①		①							
1/4" Annealed	6 mm	LLumar 8 mil	•	•	•	①	①	①	①		①	①			① ② ③	①			
1/4" Tempered	6 mm	LLumar 8 mil	•	•	•								①	①	③	① ②			
Dual Pane* (1/4" Annealed)	6 mm	LLumar 8 mil	•	•	•	①	①	①	①	①	①	①			① ③			②	
Dual Pane* (1/4" Tempered)	6 mm	LLumar 8 mil	•	•	•	①	①	①	①	①	①	①		① ③					
1/4" Tempered	6 mm	LLumar 11 mil	•	•	•	①	①	①	①		①	①							
1/4" Annealed	6 mm	LLumar 15 mil**	•	•	•														•
Dual Pane* (1/4" Annealed)	6 mm	LLumar 15 mil**	•	•	•										①	①	①		•

* On IGU: Only pane with film is protected.

** LLumar 15 Mil Product Code SCL SR MPS15

† CPSC and ANSI Testing on IGU: Only interior pane of unit is protected with film.

• Included

① With Wet Gloze Attachment System

② With Gullwing or LLumar Elite Attachment System

③ With FrameLok Attachment System

Tensile Strength (ASTM D882) PSI – Pounds per square inch

Break Strength (ASTM D882) lbf/in – Pounds force per inch width

Elongation at Break (ASTM D882) % – Percent

Peel Strength (ASTM D3330) g/in (lbf/in) – Grams per inch width (pounds per inch width)

Puncture Strength (ASTM D4830) lbf – Pounds force

SCL SR PS11	SCL SR PS15	SCL SR MPS15	R-20 SR PS4	R-35 SR PS4	R-20 SR PS8	N-1020 SR PS4	N-1040 SR PS4	N-1050 SR PS4	NUV-65 SR PS4	N-1020 SR PS8	N-1040 SR PS8	N-1050 SR PS8	SCL ER PS4
0.011	0.015	0.015	0.004	0.004	0.008	0.004	0.004	0.004	0.004	0.008	0.008	0.008	0.004
Clear	Clear	Clear	Silver Reflective	Silver Reflective	Silver Reflective	Dark Neutral	Medium Neutral	Light Neutral	Very Light Neutral	Dark Neutral	Medium Neutral	Light Neutral	Clear
Multi	Multi	Multi	Multi	Multi	Multi	Multi	Multi	Multi	Multi	Multi	Multi	Multi	Single
26,971	26,323	26,323	33,884	33,884	32,473	33,884	33,884	33,884	33,884	32,473	32,473	32,473	34,555
32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000
324	472	472	120	120	269	120	120	120	120	269	269	269	135
309	395	395	119	119	260	119	119	119	119	260	260	260	133
> 100%	> 100%	> 100%	> 100%	> 100%	> 100%	> 100%	> 100%	> 100%	> 100%	> 100%	> 100%	> 100%	> 100%
> 2720 (>6)	> 2720 (>6)	> 2720 (>6)	> 2720 (>6)	> 2720 (>6)	> 2720 (>6)	> 2720 (>6)	> 2720 (>6)	> 2720 (>6)	> 2720 (>6)	> 2720 (>6)	> 2720 (>6)	> 2720 (>6)	> 2720 (>6)
187	223	224	78	78	164	78	78	78	78	164	164	164	70



Available in thicknesses from 4-15 mil, LLumar Protective Window Film helps ensure the safety of people and property in a variety of applications, in all corners of the globe.

NOTICE ABOUT STANDARDS: The testing referenced on this document was conducted on complete window systems. A window system is comprised of components such as: Film, glass, attachment system, frame type (material and shape), anchoring etc. Results and claims are valid only when the safety film is installed as tested. A licensed professional engineer must sign off and approve the testing on systems that differ from tested samples. NOTICE: Although the information and recommendations set forth herein (hereinafter "information") are presented in good faith and believed to be correct as of the data hereof, Solutia Inc. makes no representations or warranties as to the completeness or accuracy thereof. Information is supplied upon the condition that persons receiving same will make their own determinations as to its suitability for their purposes to use. In no event will Solutia Inc. be held responsible for damages of any nature whatsoever resulting from the use of or reliance upon information or the product to which information refers. Nothing contained herein is to be construed as a recommendation to use any product, process, equipment or formulation in conflict with any patent, and Solutia Inc. makes no representation or warranty, express or implied, that the use thereof will not infringe any patent.

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