

LLUMAR SAFETY/SECURITY AND GLASS RETENTION FILM | Testing Summary Sheet



PRODUCT		SAFETY GLAZING - HUMAN IMPACT		WINDSTORM	BLAST	FORCED ENTRY
FILM	TYPE OF FILM	ANSI Z97.1	CPSC 16 CFR 1201	ASTM E1886/E1996 Silicone Attachment Required ⁽¹⁾	GSA TS01, ASTM F1642, ISO 16933, ASTM F2912 Silicone Attachment Required ⁽²⁾	EN-356
LLumar SCL SR PS4	Safety and Security	Cat B (1/8" and 1/4" Annealed)	Cat I (1/8" and 1/4" Annealed)			
LLumar SCL SR PS7	Safety and Security	Cat A (1/4" Annealed) Cat B (1/8" and 1/4" Annealed)	Cat II (1/4" Annealed) Cat I (1/8" and 1/4" Annealed)			
LLumar SCL SR PS8	Safety and Security	Cat A (1/4" Annealed) Cat B (1/8" and 1/4" Annealed)	Cat II (1/4" Annealed) Cat I (1/8" and 1/4" Annealed)	Missile Level C, 50 lb/ft ² (~140mph) 1/4" Dual-pane Annealed	GSA TS01 and ASTM F1642 (Shock-tube) 6 psi, 40 psi-msec 1/4" single-pane, annealed and tempered 1/4" dual-pane, annealed and tempered GSA: Level 2, No Hazard (single and dual-pane windows) ASTM: Minimal Hazard (single-pane windows) ASTM: No Hazard (dual-pane windows) ISO 16933, ASTM F2912 (Open-air testing) 7.94-9.34 psi, 36-38 psi-msec 1/4" single-pane, annealed and tempered ISO: Low Hazard, ASTM: Low Hazard 1/4" dual-pane, annealed and tempered ISO: No Hazard, ASTM: No Hazard	P1A 3/16" (4mm) Annealed 1500mm (59.05") drop
LLumar SCL SR PS13	Safety and Security	Cat A (1/8" and 1/4" Annealed) Cat B (1/8" and 1/4" Annealed)	Cat II (1/8" and 1/4" Annealed) Cat I (1/8" and 1/4" Annealed)			P2A 3/16" (4mm) Annealed 3000mm (118.1") drop
LLumar SHE/ SXA CL ER PS4	Glass Retention ⁽³⁾			80 lb/ft ² (~175 mph) 1/4" Dual-Pane Tempered		
LLumar SHE/ SXA CL ER PS7	Glass Retention ⁽³⁾			80 lb/ft ² (~175 mph) 1/4" Dual-Pane Tempered		

(1) 1/2" bead onto film, 1/2" bead onto frame, total bead width 3/4" (Dow Corning 995 or equivalent), see TB-44 (2) 3/4" bead onto film, 3/4" bead onto frame, total bead width 1" (Tremco ProGlaze SSG or equivalent), see TB-54 (3) Samples not subjected to Missile Impact, broken with center-punch only



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					Glass(3)	GSA Rating	ASTM Rating	
LLumar DR15 SR PS5	Safety and Security	Cat B (1/8" and 1/4" Annealed)	Cat I (1/8" and 1/4" Annealed)					
LLumar DR15 SR PS9	Safety and Security	Cat B (1/8" and 1/4" Annealed)	Cat I (1/8" and 1/4" Annealed)	Missile Level C, 50 lb/ft2 (~140mph) 1/4" Dual-pane Annealed	SA ST DA DT	3A 2 2 1	Very Low Hazard No Hazard No Hazard No Break	
LLumar DR25 SR PS5	Safety and Security	Cat B (1/8" and 1/4" Annealed)	Cat I (1/8" and 1/4" Annealed)					
LLumar DR25 SR PS9	Safety and Security	Cat B (1/8" and 1/4" Annealed)	Cat I (1/8" and 1/4" Annealed)	Missile Level C, 50 lb/ft2 (~140mph) 1/4" Dual-pane Annealed	SA ST DA DT	3B 3A 2 1	Low Hazard Minimal Hazard No Hazard No Break	
LLumar R20 SR PS5	Safety and Security	Cat B (1/8" and 1/4" Annealed)	Cat I (1/8" and 1/4" Annealed)					
LLumar R20 SR PS9	Safety and Security	Cat B (1/8" and 1/4" Annealed)	Cat I (1/8" and 1/4" Annealed)	Missile Level C, 50 lb/ft2 (~140mph) 1/4" Dual-pane Annealed	SA ST DA DT	3A 2 2 2	Minimal Hazard No Hazard No Hazard No Hazard	

(1) 1/2" bead onto film, 1/2" bead onto frame, total bead width 3/4" (Dow Corning 995 or equivalent), see TB-44 (2) 3/4" bead onto film, 3/4" bead onto frame, total bead width 1" (Tremco ProGlaze SSG or equivalent), see TB-54 (3) SA: Single Annealed ST: Single Tempered DA: Dual Annealed DT: Dual Tempered



LLUMAR SAFETY/SECURITY AND GLASS RETENTION FILM | Notes

- **ANSI Z97.1 – American National Standards Institute Z97.1 Standard: Safety Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test.** This standard establishes the specifications and methods of test for the safety properties of safety glazing materials (glazing materials designed to promote safety and reduce the likelihood of cutting and piercing injuries when the glazing materials are broken by human contact) as used for all building and architectural purposes.
 - Cat A – 100 lb impact from drop height of 48 inches (400 ft-lb impact)
 - Cat B – 100 lb impact from drop height of 18 inches (150 ft-lb impact)
- **CPSC – 16 CFR 1201, Consumer Product Safety Commission Safety Standard for Architectural Glazing Materials,** similar to ANSI Z97.1.
 - Cat I – 100 lb impact from drop height of 18 inches (150 ft-lb impact)
 - Cat II – 100 lb impact from drop height of 48 inches (400 ft-lb impact)
- **ASTM E1886 – Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials**
- **ASTM E1996 – Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes**

Missile Level C: three windows impacted by 4.5 lb, 2" x 4" x 4' (2050 g, 50.8mm x 101.6mm x 1219mm) lumber shot from air cannon at 40 ft/sec (27.3 mi/hr, 43.9 km/hr). All samples must not have an opening or significant tear. All 3 samples then subjected to cyclic pressures simulating both positive and negative pressures of a wind storm. All samples must survive 9,000 total cycles over approximately 8 hours. 2018 testing performed at maximum pressure of 50 lb/ft² (2394 Pa), approximately equal to 140 mi/hr (225 km/hr) wind.
- **GSA TS01, ASTM F1642, ISO 16933 – Test methods for Glazing and Glazing Systems Subject to Airblast Loadings.**

Blast Pressure usually measured in psi (lb/in²). Impulse is approximately equal to blast pressure (psi) multiplied by length of blast in milli-seconds (msec), giving psi-msec for impulse. Ratings for these standards measure amount of glass leaving window and frame towards building interior and likelihood of injury to building occupants. GSA Ratings are: No Hazard (GSA Levels 1 and 2), Very Low Hazard (Level 3a), Low Hazard (Level 3b), Medium Hazard (Level 4), High Hazard (Level 5). Other test methods have similar rating systems.
- **EN-356 – European Standard, Glass in building - Security glazing - Testing and classification of resistance against manual attack**

4.11 kg (9.1 lb) steel ball dropped from various heights, 3 glass/film samples, 3 impacts on each sample, 9 total impacts, no impacts can allow steel ball to penetrate. P1A drop height (1500mm, 59"), P2A drop height (3000mm, 118").

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