

**Explosive tests performance results per GSA security criteria
With 3M™ Scotshield™ Safety and Security Window films**

Test # Standoff distance Peak Pressure	Unit #	Test Articles	Performance level achieved (GSA rating)
Test 1 Standoff = 170 ft Peak Pressure = 4.19 psi	1	¼” AG monolithic, SH8CLARL, 4 side Ultraflex (wet glaze)	3b
	2	¼” AG monolithic, SCLARL400, 4 side Ultraflex (wet glaze)	3b
	3	¼” AG monolithic, SCLARL400, 4 side batten	4
	4	¼” AG insulated, SCLARL400, 4 side Ultraflex (wet glaze)	2
Test 2 Standoff = 170 ft Peak Pressure = 4.15 psi	1	¼” AG monolithic, SH8CLARL, 2 side batten	5
	2	¼” AG monolithic, SCLARL400, 2 side batten	4
	3	¼” AG monolithic, Ultra600, 2 side batten	4
	4	¼” AG insulated, Ultra600, 4 side Ultraflex (wet glaze)	2
Test 3 Standoff = 170 ft Peak Pressure = 4.23 psi	1	¼” AG monolithic, SH8CLARL, 4 side batten	3b
	2	¼” TG monolithic, SH8CLARL, daylight application	3b
	3	¼” AG monolithic, SH8CLARL, daylight application	3b
	4	¼” AG insulated, SCLARL400, 4 side batten	2
Test 4 Standoff = 170 ft Peak Pressure = 4.21 psi	1	¼” AG insulated SH8CLARL, 4 side Ultraflex (wet glaze)	2
	2	¼” AG insulated Ultra600, daylight application	3b
	3	¼” AG insulated SH8CLARL, daylight application	5
	4	¼” AG insulated, SH8CLARL, 4 side batten	3a

Test Notes:

- 1) All window units had a ½ inch minimum bite
- 2) All windows were mounted in commercial aluminum frames: clear opening = 46 inches x 64 inches.
- 3) AG = annealed glass, TG = tempered glass
- 4) Witness panels were located 120 inches behind window
- 5) The test bed is situated at an altitude of 6,200 feet above sea level
- 6) Window edges (left and right) are based on a person standing to the exterior of the window looking inward
- 7) All wet glazed systems contained ½ inch (glazing edge) x ¾ inch (frame edge) silicone contact lengths
- 8) 3M Ultraflex was used for all wet-glazed attachments
- 9) Windows were mounted by “sandwiching” the frame between steel plates (mounted to the outside of the window opening) and steel tubes (mounted to the inside of the window opening). The steel plates were mounted to the structure using ½ inch diameter bolts spaced at 12 inches on center while tube bolts were spaced at 6 inches on center. # 10 self-tapping screws spaced at 12 inches on center connected the outer steel [plates to the aluminum frame.
- 10) 2-sided mechanical attachments were connected along the jambs of the window frames.

**Explosive Tests Performance Results per GSA Security Criteria
With 3M™ Scotchshield™ Ultra Security Window Films**

Test # / Standoff / Peak pressure*	Unit #	Test Articles	Performance Level Achieved (GSA Rating)
Test 1 Standoff = 190 ft Peak pressure = 4.0 psi	1	1/4-in. mono. AG, Ultra 400 w/day-life application	3-SHR
	2	1/4-in. mono. AG, Ultra 400 w/4-sided batten	3-SHR
	3	1/4-in. mono. AG, 7-mil film w/4-sided batten	3-SHR
	4	1/4-in. mono. AG (no film)	5
Test 2 Standoff = 190 ft Peak pressure = 4.0 psi	1	1/4-in. mono. HSG, Ultra 400 w/4-sided batten	3-SHR
	2	1/4-in. mono. TTG, Al frame, Ultra 400 w/4-sided batten	3-SHR
	3	1/4-in. mono. AG, Al frame, Ultra 400 w/4-sided batten	5-SHR
	4	1/4-in. mono. AG, Ultra 400 w/2-sided batten	3-SHR
Test 3 Standoff = 165 ft Peak pressure = 5.0 psi	1	1/4-in. mono. TTG, Ultra 400 w/4-sided batten	3-SHR
	2	1/4-in. mono. TTG, Ultra 600 w/4-sided batten	2
	3	1/4-in. mono. HSG, Ultra 600 w/4-sided batten	3-SHR
	4	1/4-in. mono. TTG, Ultra 400 w/day-lite application	3
Test 4 standoff = 190 ft peak pressure = 4.0 psi	1	1/4-in. mono. AG, Ultra 600 w/4-sided batten	3
	2	1/4-in. mono. TTG, Al frame, Ultra 400 w/4-sided wet glaze	2
	3	1/4-in. mono. AG, Al frame, Ultra 400 w/4-sided wet glaze	3-SHR
	4	1/4-in. mono. TTG, Ultra 400 w/4-sided batten	3-SHR
Test 5 Standoff = 121 ft Peak pressure = 9.0 psi	1	3/8-in. mono. TTG, Ultra 400 w/4-sided batten	3
	2	1/2-in. mono. TTG, Ultra 600 w/4-sided batten	2
	3	1/2-in. mono. TTG, Ultra 400 w/4-sided batten	5-SHR
	4	3/8-in. mono. TTG, Ultra 400 w/day-life application	3-SHR
Test 6 Standoff=121 ft Peak pressure = 9.0 psi	1	1/4-in. mono. TTG, Ultra 400 w/day life application	5
	2	1-in. insulated TTG, Ultra 400 w/4-sided batten	3-SHR
	3	1 in. insulated TTG, Ultra 600 w/4-sided batten	2
	4	1 in. insulated TTG (no film)	5

* Standoff distance and peak pressure have been adjusted for altitudes of 5200 ft.

Notes:

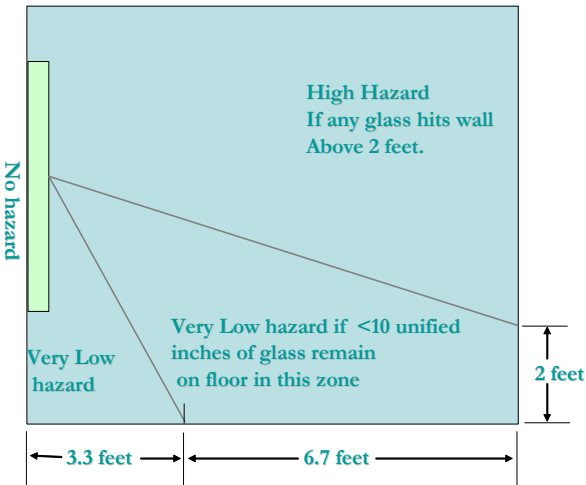
- A. AG = annealed glass, HSG = heat strengthened glass, TTG = thermally tempered glass
- B. Windows were mounted in heavy steel frames unless otherwise noted.
- C. Window sizes for all steel frames were: 48 x 66 inches; clear opening 46 x 64 inches.
- D. Window sizes for aluminum frames were: 46 1/8 x 64 1/8 inches; clear opening = 45 1/2 x 63 1/2 inches.
- E. Witness panels were located 116 inches behind window.
- F. The SHR stands for significant-hazard-reduction. This designation is used to distinguish performances within the same given GSA hazard condition; i.e. a 3-SHR is a better performance rating in that the tested sample provided significantly more hazard mitigation compared to that of a standard 3. The SHR designation can be given for GSA conditions 3-5.
- G. Tested at the Defense Special Weapons Agency Chestnut Site, Kirtland AFB, New Mexico.

US Army Corps of Engineers Rating

3M now has USACE (US Army Corps of Engineers) “Very Low Hazard” rating for our most popular Ultra films, combined with the Ultraflex attachment system. This will open the doors for additional Government jobs that specify the USACE performance criteria instead of GSA performance criteria.

	Unit No.	DESCRIPTION	USACE Rating	GSA Rating
Test 1 4.8 psi	1	¼" mono AG S50NEAR400 Ultraflex	VLH	3b
	2	¼" mono AG S50NEAR400 Ultraflex	VLH	3b
	3	¼" mono AG SCLARL400 Ultraflex	VLH	3b
	4	¼" mono AG SCLARL400 Ultraflex	VLH	3b
Test 2 4.8 psi	1	¼" ins AG Ultra600 butt splice Ultraflex	LH	3b
	2	¼" ins TG Ultra600 butt splice Daylight	LH	3b

USACE Requirements For Level C Buildings



GSA Requirements For Level C Buildings

