Blast Mitigation

- To reduce likelihood of glass shards from becoming projectiles
- State of the Art Micro-layered film structure with superior tear strength and flexibility
- Designed for impact energy absorption / dissipation
- Ultra S600, S400

- June 2005
- Terrorist attack at international hotel
- Ultra S600 held glass together in ground level window

3M Ultra vs. Laminated Glass

	Blast Performance Rating	
Window Type	**Laminated Glass**	**Ultra S600 Window Film**
	Minimal Hazard 6 psi, 41 psi*msec	No Hazard 6 psi, 41 psi*msec
	Minimal Hazard 6 psi, 41 psi*msec	Minimal Hazard 6 psi, 41 psi*msec
	Minimal Hazard 6 psi, 41 psi*msec	Minimal Hazard 10 psi, 89 psi*msec
	Minimal Hazard 10 psi, 89 psi*msec	No Break 10 psi, 89 psi*msec

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www.seaminglystraight.com 702.810.0035 email: Onaroll@seaminglystraight.com

2011 Shock Tube Tests
Ultra S600 vs Laminated Glass

Summary of Results – by Window Type

Insulated Glass Windows – Laminated Glass[1]				
Window Type	**Product Code**	**Blast Load (nominal)**	**ASTM F1642 Rating**	**GSA-TS01 Rating**
Fixed	RW001U0001	6 psi, 41 psi*msec	Minimal Hazard	2
Fixed / Casement	RW001U0003	6 psi, 41 psi*msec	Minimal Hazard	2
Fixed / Project	RW001U0005	10 psi, 89 psi*msec	Minimal Hazard	2
Fixed / Sliding	RW001U0007	6 psi, 41 psi*msec	Minimal Hazard	2

Insulated Glass Windows -- 3M™ Ultra S600 Safety and Security Window Film[2]				
Window Type	**Product Code**	**Blast Load (nominal)**	**ASTM F1642 Rating**	**GSA-TS01 Rating**
Fixed	RW001U0002	6 psi, 41 psi*msec	No Hazard	2
Fixed / Casement	RW001U0004	10 psi, 89 psi*msec	Minimal Hazard	2
Fixed / Project	RW001U0006	10 psi, 89 psi*msec	No Break	1
Fixed / Sliding	RW001U0008	6 psi, 41 psi*msec	Minimal Hazard	2

[1] Laminated Glass Windows comprised of 1/4" heat strengthened glass on exterior pane; 1/2" air gap; laminated annealed glass on interior pane (1/8" annealed glass, 0.030" PVB interlayer, 1/8" annealed glass). Interior pane glazed into frame bite with Dow Corning 983 structural silicone sealant.

[2] Windows incorporating fragment retention window film comprised of 1/4" heat strengthened glass on exterior pane; 1/2" air gap; 1/4" annealed glass on interior pane with 3M™ Ultra S600 window film applied. Window film professionally wet-applied to surface #4, edge-to-edge, prior to mounting glass into frame. Interior pane wet glazed into frame bite with Dow Corning 983 structural silicone sealant.

Casement Window – 10 psi, 89 psi*msec

Laminated Glass

High Hazard

Ultra S600

Minimal Hazard

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