

Cleargard[®] Transparent Polymer

Cleargard[®] Advantages

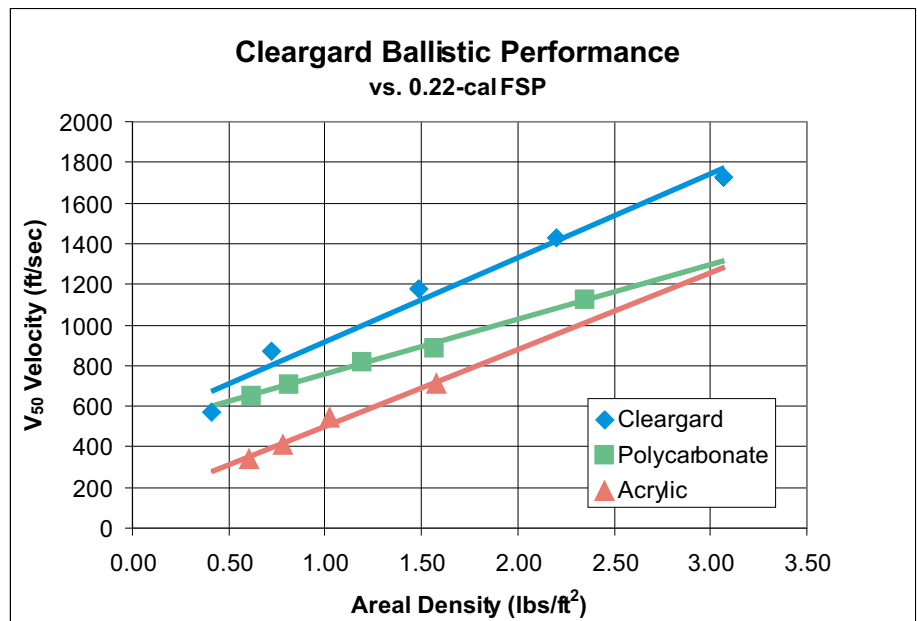
- Excellent impact resistance
- Excellent chemical resistance
- Castable to any shape

- ✓ Lower density than acrylic or polycarbonate
- ✓ High impact resistance
- ✓ High ductility
- ✓ Excellent optical clarity
- ✓ High thermal and chemical resistance
- ✓ Superior abrasion resistance compared to acrylic and polycarbonate
- ✓ Liquid castable to complex shapes or sheet form
- ✓ Compatible with a variety of dye packages and coatings

Cleargard can be used in monolithic or laminated form to stop fragments and hand gun fired projectiles. Laminated behind glass Cleargard can defeat an array of rifle threats.

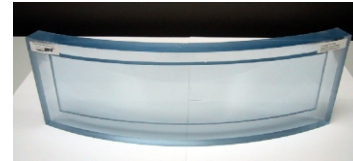
Fragment Armor

In monolithic sheet form, Cleargard has demonstrated superior ballistic performance against fragment simulating projectiles (FSPs) conforming to MIL-P-46593. For example, against the 0.22-cal, 17 grain FSP at 1,180 ft/sec Cleargard provides equivalent performance to polycarbonate with a 42% weight savings.



Handgun Armor

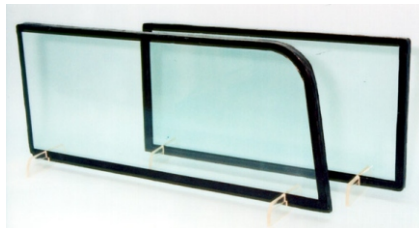
In monolithic sheet form, Cleargard has demonstrated superior ballistic performance against hand gun projectiles such as those specified in National Institute of Justice Standard 0108.01. For example, Cleargard meets Level III-A protection level defeating the 9-mm FMJ and 0.44-cal MAG projectiles at an areal density of 7.0 lb/ft² and a thickness of 1.25-in. This compares to 8.1 lb/ft² and 1.30-in. thickness for the leading transparent polycarbonate laminate.



Riot shield ballistic viewport



Aircraft cockpit door ballistic window



Ground vehicle ballistic transparencies

Rifle Armor

When used as a backing layer behind high performance glass, Cleargard provides superior performance against lead core rifle projectiles. For example, a glass/Cleargard laminate meets NIJ Standard 0108.01 Level III defeating a .308 Winchester, 150 grain projectile at an areal density of 10.5 lb/ft² and a thickness of 1.05-in. This compares to 11.7 lb/ft² and 1.09-in. thickness for a conventional transparent glass/polycarbonate armor. Similar comparative weight savings exist when tested against military ball-type projectiles.

Cleargard versus Polycarbonate

Threat Type	Projectile	Velocity (ft/sec)	Cleargard		Polycarbonate	
			Lb/ft ²	inches	Lb/ft ²	inches
Fragment	0.22-cal, 17-gr FSP MIL-P-46593	1180	1.48 (monolithic)	.25	2.57 (monolithic)	.41
Handgun	.44 MAG, 240-gr NIJ STD 0108.01 Level III-A	1400	7.0 (monolithic)	1.22	8.1 (laminated)	1.30
Rifle	7.62-mm M80 Ball NIJ STD 0108.01 Level III	2750	10.5 (glass/Cleargard)	1.05	11.7 (glass/Polycarbonate)	1.09

Potential Applications

- ✓ Transparent armor products
- ✓ Architectural and automotive glazing
- ✓ Aircraft transparencies
- ✓ Bank teller window glazing
- ✓ Protective face shields and masks
- ✓ Medical components
- ✓ Electronics and display screens
- ✓ Ground vehicle and aircraft lighting lens covers

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Protecting People in Motion