Bulletproof Glass

The bulletproof glass is a multi-purpose protective design element that protects & safeguards the indoors from the hard impacts. For places where there can be no compromise on safety, this transparent armor-like glass is an aesthetically coherent design option. The applicability of this high-end security glass continues to increase and is now used extensively in vehicles, offices, commercial buildings, schools, and houses. These bullet glass sheets are aesthetically-pleasing and provide incredible damage resistance to different ranges of projectile impact.

Bulletproof Glass Specification

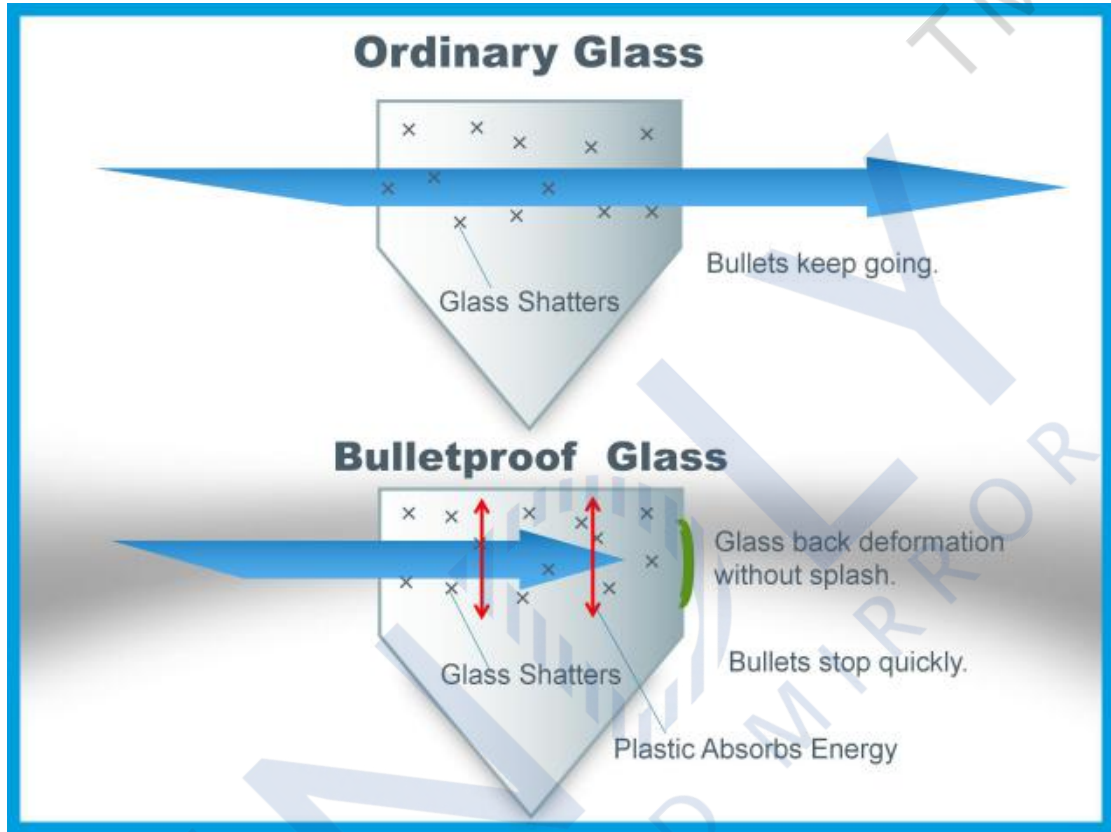| Shapes	Square, Round, Triangle, Arch, Octagon, Custom
Glass Types	Float Glass (Standard)
Glass Thickness	3/4"(19mm),1 1/10"(27mm),1 2/5"(36mm),　1 3/5"(40mm), 2 1/4"(56mm)
Colors	Clear, Ultra Clear,Grey, Bronze,Blue.
Glass Edge Work	Flat Polish

How Bulletproof Glass Works

Photo: Top: Ordinary glass shatters and does nothing to stop the passage of a speeding bullet. Bottom: Bulletproof glass shatters too, but the layers of plastic sandwiched between the layers of glass absorb and dissipate the bullet's energy. If it does manage to penetrate through the glass, it will be greatly slowed down and it will do much less damage.

"Bulletproof" glass is very different to ordinary glass. More correctly called bullet-resistant glass (because no glass is totally bulletproof), it's made from multiple layers of tough glass with "interlayers" of various plastics. Sometimes, there's a final inner layer of polycarbonate (a tough type of plastic) or plastic film to prevent "spalling" (where dangerous shards of glass or plastic splinter off following the impact of a bullet). This sandwich of layers is called a laminate. It can be up to ten times thicker than a single pane of ordinary glass and it's usually very heavy.

When a bullet strikes bulletproof glass, its energy spreads out sideways through the layers. Because the energy is divided between a number of different pieces of glass and plastic, and spread over a large area, it is quickly absorbed. The bullet slows down so much that it no longer has enough energy to pierce through—or to do much damage if it does so. Although the glass

Where Is The Bulletproof Glass Used?

Bulletproof glass comes in all shapes and sizes to give different levels of protection in different situations. You're most likely to find it in places like banks, where the tellers typically sit behind thick bulletproof windows and use bulletproof drawers to exchange paperwork and money with customers. Generally speaking, the thicker the glass and the more layers it has, the more energy it can absorb and the more protection it will give. Basic bulletproof glass ranges from about 3cm (1.185 in) to 4cm (1.59 in) thick, but it can be made twice this thick if necessary.

The only problem is, the thicker you make bulletproof glass the heavier it becomes. That may not be a problem in a bank, but it's certainly a consideration when you're trying to bulletproof a president's car or a "Popemobile". Making bulletproof glass thicker also makes it slightly more opaque, because light struggles to get through all those extra layers. That can cause difficulties if it impairs the driver's visibility. Rap artist Buster Rhymes ran into problems in 2007 when police stopped his SUV (with its 5cm/2in-thick bulletproof glass) "for having excessively tinted windows" (only 70 percent light transmission).

Standards for Bulletproof Glass
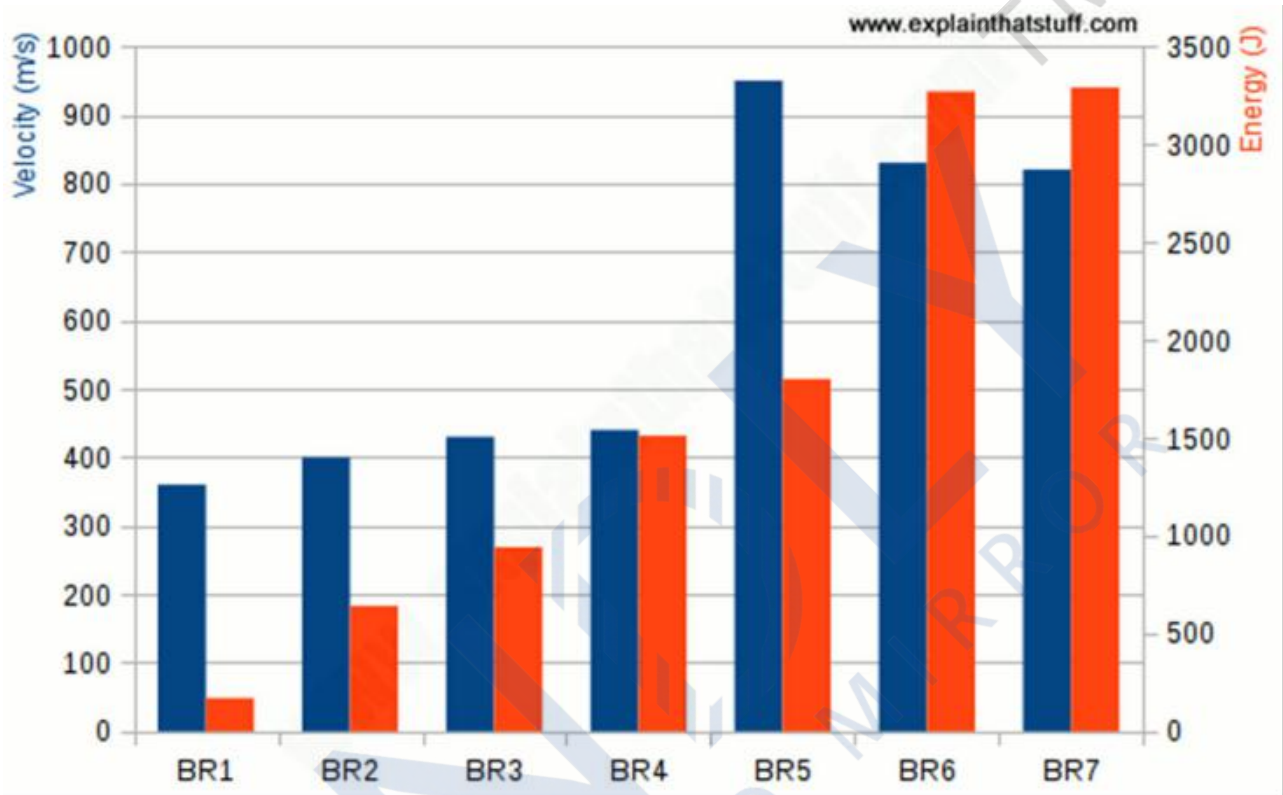

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Chart: You need thicker glass to stop bullets with higher velocities and energies. This chart compares the effectiveness of bulletproof glass rated BR1–7 on the standard EN/CEN 1063. BR1 would typically be around 13–15mm (0.5–0.6in) thick; BR7 would be more like 75–85mm (3–3.5in)—roughly six times thicker.

Different standards exist in different parts of the world. In the United States, the effectiveness of bulletproof glass is typically compared using NIJ (National Institute of Justice) Standard 0108 for Ballistic Resistant Protective Materials (September 1985), which lists seven kinds of armor broken into five main types (Types I, II-A, II, III-A, III, IV, and Special). The highest classification, Type IV, must be able to cope with a single hit from a 30-caliber armor piercing rifle with a bullet mass of 10.8g and measured velocity of 868±15m/s. In the UK, the relevant British Standard is BS EN 1063:2000, which compares nine different types of glass (BR1 for handguns and rifles, BR2–4 for handguns, BR5–7 for rifles; and SG1–2 for shotguns). Elsewhere in Europe, that's equivalent to CEN 1063.

KINDLY™ GLASS AND MIRROR — Bulletproof Glass

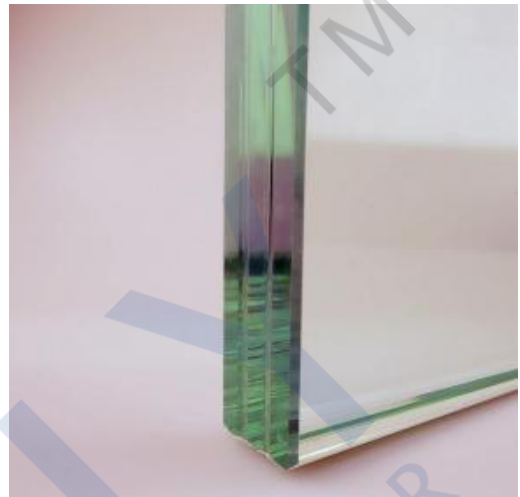| Configuration	Thickness	VT%	Firearms and ammunition	Target range	Quadrant angle	Warhead velocity	Shot situation	Penetration depth of impact surface	Back bulge height
8mm + 1.52mmpvb + 6mm + 1.25mmpvb + 6mm + 1.25mmPU + 3.0mmPC	19mm (3B-19-I)	78%	Type 51-1 7.62mm pistol bullet (steel core) + Type 79 7.62mm light submachine gun	5M	0°	515±10M/s	Not through	4.3mm	3.3mm
8mm + 1.52mmpvb + 8mm + 1.52mmpvb + 8mm + 0.28mmMembrane	27mm (3B-27-I)	75%	Type 79 7.62mm light submachine gun + Type 51-1 7.62mm pistol bullet (steel core)	5M	0°	515±10M/s	Not through	4.5mm	1.1mm
10mm + 0.76mmpvb + Interlayer + 10mm + 1.25mmPU + 3.0mmPC	36mm (F56B-36)	75%	Type 56 7.62mm submachine gun, ammunition: Type 56 7.62mm ordinary projectile (steel core)	10M	0°	738-742M/s	Not through	22mm	1.0mm
8mm + 1.52mmpvb + 8mm + 1.52mmpvb + 8mm + 0.76mmpvb + 8mm+1.25mmPU + 4.5mmPC	40mm (FM14B-40)	75%	M14 7.62mm automatic rifle with 7.62mm NATO ammunition	10M	0°	814-822M/s	Not through	24.4mm	4.3mm
10mm + 1.52mmpvb + 10mm + 1.52mmpvb + 10mm + 0.76mmpvb + 8mm +1.25mmPU + 3.0mmPC	56mm (FM14B-56)	65%	M14 7.62mm automatic rifle with 7.62mm NATO ammunition	10M	0°	822-828M/s	Not through	15.5mm	0.6mm

Who Invented Bulletproof Glass?

Artwork: Earl Fix's idea was to sandwich polyvinyl acetal resin (PVA) between two layers of glass. Artwork from US Patent 2,045,130: Safety Glass, courtesy of US Patent and Trademark Office.

Modern bulletproof glass is simply a variation on laminated safety glass, and that was invented by a French chemist named Édouard Bénédictus (1878–1930), who took out a patent on the idea in 1909. His original version used celluloid (an early plastic) sandwiched between two sheets of glass. The idea of using polyvinyl plastics in laminated glass dates from 1936, when it was first proposed by Earl Fix of the Pittsburgh Plate Glass Company. Popular Science was flagging up the possible use of bulletproof glass in armored police buses the following year (in its April 1937 issue).

If you wanted "bulletproof glass" before the 1930s, you had to resort to using very thick ordinary glass: gangster Al Capone's 1928 Cadillac—one of the first ever bulletproof vehicles—didn't have modern laminated safety glass but inch-thick ordinary glass.

KINDLY™ GLASS AND MIRROR Bulletproof Glass

Broken................Bulletproof..................Safety

Thank you for your using our products!

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