TECHNICAL GUIDE

Bullet-Resistant Glazing

Explained and simplified

There is no such thing as bulletproof glass. There is only glazing certified against a **specific round**, fired at a **specific velocity**, from a **specific distance**, a **specific number of times**.

Everything about it comes down to two things: **which weapon** you are protecting against, and **whether the glass is allowed to spray the person behind it**.

1 · The round sets the class — EN 1063

EN 1063 classifies the glazing itself. Each class is defined by a cartridge, bullet construction, mass, impact velocity and firing distance. Three shots are fired in a 120 mm triangle on a 500 × 500 mm specimen.

Class	Cartridge	Bullet	Mass	Velocity	Range
BR1	.22 LR	Lead, round nose	2.6 g	360 m/s	10 m
BR2	9 × 19 Luger	Full jacket, round nose, soft core	8.0 g	400 m/s	5 m
BR3	.357 Magnum	Full jacket, cone, soft core	10.2 g	430 m/s	5 m
BR4	.44 Rem. Magnum	Full jacket, flat nose, soft core	15.6 g	440 m/s	5 m
BR5	5.56 × 45 (.223 Rem.)	Full jacket, pointed, soft core with steel penetrator	4.0 g	950 m/s	10 m
BR6	7.62 × 51 NATO (.308)	Full jacket, pointed, soft core	9.5 g	830 m/s	10 m
BR7	7.62 × 51 NATO	Full jacket, pointed, **hardened steel core**	9.8 g	820 m/s	10 m
SG1	12/70 shotgun	Solid lead slug — single shot	31 g	420 m/s	3 m
SG2	12/70 shotgun	Solid lead slug — three shots	31 g	420 m/s	3 m

Classes are cumulative in intent but not in construction: a build-up certified to BR6 will not necessarily pass BR7, because BR7 introduces a hardened steel core rather than simply more energy.

2 · The American classes — UL 752

UL 752 classifies bullet-resisting equipment as tested — glazing, frames, doors, barriers and transaction units. Levels 1 to 3 are handgun, 4 to 5 are single-shot rifle, and 6 to 8 repeat the handgun and rifle threats at higher shot counts.

Level	Cartridge	Bullet	Shots	Velocity (ft/s)
1	9 mm	Full metal copper jacket, lead core	3	1,175–1,293
2	.357 Magnum	Jacketed lead soft point	3	1,250–1,375
3	.44 Magnum	Lead semi-wadcutter, gas checked	3	1,350–1,485
4	.30-06 rifle	Lead core soft point	1	2,540–2,794
5	7.62 mm NATO (.308)	Full metal copper jacket, military ball	1	2,750–3,025
6	9 mm	Full metal copper jacket, lead core	5	1,400–1,540
7	5.56 mm (.223)	Full metal copper jacket, military ball	5	3,080–3,388
8	7.62 mm NATO (.308)	Full metal copper jacket, military ball	5	2,750–3,025
9	.30-06	Armour piercing	1	2,715–2,987
10	.50 BMG	Full metal copper jacket, military ball	1	2,810–3,091

3 · NIJ 0108.01

The NIJ standard for ballistic resistant protective materials is sometimes cited on government and law-enforcement work. It assesses **penetration only** — it does not evaluate spall.

Level	Threat	Broadly comparable
I	.22 LR and .38 Special	EN BR1 · below UL 1
II-A	9 mm and .357 Magnum, lower velocity	EN BR2–BR3 · UL 1–2
II	9 mm and .357 Magnum, higher velocity	EN BR3 · UL 2
III-A	.44 Magnum and 9 mm submachine gun	EN BR4 · UL 3
III	7.62 mm NATO full metal jacket	EN BR6 · UL 5 / UL 8
IV	.30-06 armour piercing	EN BR7 · UL 9

READ THIS BEFORE QUOTING A CONVERSION

The comparison columns in this guide are **indicative only**. EN 1063, UL 752 and NIJ 0108.01 use different ammunition, velocities, shot counts, specimen sizes and conditioning temperatures. A product certified to one is not certified to the others, and no cross-reference table substitutes for a test report.

4 · Spall — the letters after the class

When a bullet strikes, the glazing may stop it and still throw fragments off the protected face. That debris is called **spall**, and at close range it can seriously injure the person the glazing was installed to protect. EN 1063 records it as a suffix.

NS
NO SPALL

No splinters on the protected side

Specified where staff sit or stand directly behind the glazing — bank counters, reception desks, guard houses, public service windows.

S
SPALL

Splinters permitted on the protected side

Acceptable where nobody is immediately behind the glazing, or where a set-back or secondary screen protects the occupant.

THE DETAIL THAT GETS FORGOTTEN

BR4 NS and **BR4 S** stop the same bullet. Only one of them is safe to stand behind. If a classification on a drawing carries no suffix, ask before pricing.

5 · Glass alone, or the whole window

This catches out more specifications than anything else in the subject. The European system uses **two different sets of letters** depending on what was actually tested.

	What is tested	Classes	Standard
BR	The glazing on its own, as a 500 × 500 mm specimen	BR1–BR7, SG1–SG2	EN 1063
FB	The complete assembly — glazing, frame, seals, hinges and fixings, in its installed configuration	FB1–FB7, FSG	EN 1522 / EN 1523

THE POINT THAT MATTERS MOST

BR7 glass in an untested frame is not a BR7 window. A round that cannot pass through the glazing will pass through a frame, a bead or a fixing that was never tested. What protects the occupant is the assembly, not the pane.

6 · Aluminium or steel

We build certified ballistic systems in both. The right choice depends on the class required, the size of the opening and where the element sits in the building.

	Aluminium framed	Steel framed
Best for	Architectural and public-facing locations — embassies, banks, corporate reception, government counters, airports	Higher classes and controlled-access points — guard houses, sally ports, control rooms, secure entrances, perimeter buildings
Appearance	Slim sightlines, matches adjacent non-rated glazing, full RAL and anodised finish range	Heavier sections; can be finished architecturally but reads as a security element
Construction	Thermally broken profiles with concealed steel reinforcement where the class requires it	Welded steel sections sized for the glazing weight and the ballistic class
Weight	Lighter — lower loading on the structure, easier handling and installation	Heavier — the supporting structure, hinges and hardware must be designed for it
Envelope use	Thermally broken options available for external applications	Requires deliberate detailing where it forms part of the external envelope

As a rule, aluminium suits the lower and middle classes and anything where the glazing must read as architecture. Steel takes over as the class, the glass weight and the opening size increase. The exact crossover depends on the tested system, so it is worth asking rather than assuming.

7 · What else to think about

- **Thickness and weight.** Ballistic glazing is heavy and thick, and both rise sharply with the class. This drives frame depth, hardware, hinges, structural loading and how the units are lifted into place. It is a co-ordination issue, not just a product choice.
- **Doors need more than glass.** Hinges, locks, closers and the frame all have to be part of the tested assembly. A ballistic leaf on standard ironmongery is not a ballistic door.
- **Attack from one side only.** Ballistic classes are tested from the threat side. Which face that is must be stated, and it must be installed that way round.
- **Ballistic is not blast, and not forced entry.** Separate standards, separate tests, separate build-ups. A ballistic rating confers none of the others.
- **Sight and speech.** Counters and reception positions usually need a transaction detail — a tray, a pass-through or a speech panel — designed as part of the certified assembly.

8 · The four things that go wrong most often

	The mistake	Why it matters
1	A class with no spall suffix — “BR4” with no S or NS	Both stop the bullet. Only one is safe to stand behind
2	Specifying BR when FB was meant	BR is the glazing alone. The frame, seals and fixings are untested and become the weak point
3	Treating EN, UL and NIJ classes as interchangeable	Different ammunition, velocities, shot counts and conditioning. They are not equivalent
4	Ignoring weight, thickness and hardware early	Discovered at shop drawing stage, when the structure and the openings are already fixed

9 · Quick reference

If you need to…	You need
Protect staff sitting directly behind the glass	The class, with **NS** — no spall
Protect a complete window or door, not just the pane	An **FB** class to EN 1522 / 1523, or a UL 752 listing for the assembly
Protect against handguns	BR2–BR4 · UL Levels 1–3 · NIJ II-A to III-A
Protect against military rifles	BR5–BR7 · UL Levels 5, 7, 8 · NIJ III–IV
Keep slim architectural sightlines	Aluminium framed system
Reach the higher classes, or a large secure opening	Steel framed system

10 · The range at British Aluminium

We supply the complete range across both certification systems — EN and UL — in aluminium and in steel, as certified assemblies rather than separately rated parts.

Range	Products	Standards
Fire-rated doors	Hinged, pivoted, sliding and automatic sliding; solid and glazed	EN 13501-2 / EN 1634-1 · UL 10C / NFPA 252
Fire-rated windows and screens	Fixed and operable windows, glazed screens and partitions	EN 13501-2 / EN 1364-1 · UL 9 / NFPA 257 / ASTM E119
Fire-rated curtain wall	Stick-built and unitised, internal and external	EN 1364-3 · ASTM E119 / UL 263
Blast-resistant systems	Curtain wall, windows, aluminium and steel blast doors, bunker and hangar doors	EN 13123 / 13124 / 13541 · GSA-TS01 / ASTM F1642 / UFC

Range	Products	Standards
Ballistic-resistant systems	Aluminium and steel framed glazing, doors and public counters	EN 1522 / EN 1063 · UL 752 / NIJ 0108.01
Acoustic systems	80 mm and 100 mm double-glazed partitions, acoustic doors and screens	EN ISO 10140 / EN ISO 717-1 · ASTM E90 / E413 / E1332
Combined performance	Fire with blast, ballistic with acoustic, and other multi-requirement assemblies	Certified per configuration

The easiest way to start: tell us the class you need, whether spall is acceptable, and send the elevation and door and window schedule. We will confirm which of our aluminium or steel systems meets it, and flag the weight and structural implications before anything is priced.

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Issued for information. Selection of the threat level and the required ballistic class is the responsibility of the project's security consultant and the authority having jurisdiction. This document does not constitute security engineering advice. Ammunition data and cross-system comparisons are indicative; classification is established only by test to the governing standard. Standards are cited as at the date shown and this guide is revised without notice; always work from the current issue.