Synergy Group
Innovative Windows & Doors™

EVA vs. SGP vs. PVB

A comparative analysis and selection guide for structural interlayers in laminated glass. Prepared by Synergy Group: Fabrication and Specification Guidance for Laminated Glass Systems.

Executive summary: SGP is the preferred interlayer for high-load and safety-critical structural glazing; EVA offers strong edge stability, moisture resistance, and fabrication flexibility in semi-structural or specialty applications; PVB remains suitable for standard framed glazing where structural demand is lower and cost control is a priority.

In modern architecture and advanced glass processing, glass is no longer merely a filler; it has become a load-bearing element within the building envelope. From glass staircases in flagship retail environments to suspended swimming pools and oversized skylights, structural glass continues to push the limits of engineering and fabrication.

The performance of these assemblies is often determined less by the glass itself than by the polymer interlayer between the glass plies. That thin layer governs bonding, impact retention, post-breakage behaviour, edge stability, and long-term durability.

This document compares the three mainstream interlayer technologies used in laminated glass applications—PVB, EVA, and SGP—and outlines how each should be evaluated in structural and semi-structural applications.

Why structural interlayers determine the safety and performance of laminated glass

Structural laminated glass must do more than remain transparent. It must resist impact, stay intact after breakage, and in many cases continue to provide residual performance under load.

Glass is inherently brittle. In laminated construction, the interlayer acts as both adhesive and ligament: it permanently bonds the glass plies together and bears the remaining load after fracture, helping prevent penetration, fallout, or collapse.

For structural engineers and glazing professionals, interlayer selection is one of the most consequential decisions in a curtain wall, canopy, railing, or overhead glazing package. An inappropriate interlayer can lead to yellowing, delamination, excessive deflection, or loss of expected post-breakage safety performance under impact, wind load, moisture, or temperature exposure.

Although PVB has dominated the market for decades, the increased use of clear EVA technologies and the widespread adoption of SGP in high-performance glazing have shifted the decision framework. Understanding the distinct role of each interlayer is essential for correct specification.

Interlayer technology for laminated glass: three mainstream approaches

The differences among PVB, EVA, and SGP begin at the material level. Each represents a distinct polymer chemistry and a different performance profile in service.

PVB (Polyvinyl Butyral)

PVB is a thermoplastic interlayer characterized by softness, flexibility, and high elongation. It absorbs impact effectively, which is why it remains the standard interlayer in automotive windshields and many standard safety-glazing applications. However, it is susceptible to creep under sustained load and becomes significantly less effective in transmitting shear as temperatures rise.

EVA (Ethylene Vinyl Acetate)

EVA used for glass lamination is a thermosetting interlayer. During lamination it cross-links into a three-dimensional network, which means that once cured it does not soften and flow in the same way as a thermoplastic. Its processing flexibility, moisture resistance, and visual clarity have made it increasingly relevant in architectural glass.

SGP (Ionoplast)

SGP, commonly referenced through the SentryGlas family, is an ionoplast interlayer developed specifically for structural performance. Its ionic bonding produces significantly higher strength and stiffness than conventional PVB, allowing laminated assemblies to perform more like monolithic structural elements under load.

Clear EVA interlayer: a structural option balancing processing adaptability

Many specifications still associate EVA only with photovoltaic encapsulation, but modern architectural-grade clear EVA interlayers have become a credible option in glazing where clarity, weather resistance, and manufacturing flexibility are required.

EVA is especially compelling in shower enclosures, canopies, decorative laminates, smart glass assemblies, and non-load-bearing railings where open edges or elevated humidity make PVB less desirable.

- High optical clarity and low haze, particularly when paired with ultra-clear glass.
- Strong moisture resistance and edge stability, especially in exposed-edge or high-humidity environments.
- Compatible with vacuum lamination processes and well-suited to encapsulating decorative or functional inserts such as mesh, fabrics, wires, and PDLC films.
- A cost-effective solution for semi-structural and specialty applications where the absolute stiffness of SGP is not required.

SGP interlayer: the preferred solution for high-strength structural glass

SGP is the heavy-duty option in the interlayer category. It was developed specifically to overcome the limitations of PVB in structural applications and has become the benchmark where residual strength and stiffness are critical.

The most important distinction is post-breakage performance. Where a PVB laminate may sag substantially after fracture, an SGP laminate can retain far greater rigidity, helping the broken assembly remain in position and continue to provide a meaningful level of protection.

- Very high stiffness and shear modulus relative to PVB.
- Minimal deflection under wind load, enabling stronger coupling between glass plies.
- Exceptional post-breakage behaviour; shattered plies remain more stable and more capable of retaining fragments in place.
- Widely used in hurricane-resistant glazing, blast-resistant assemblies, frameless railings, glass floors, large skylights, and oversized curtain wall panels.

PVB interlayer: the limitations of the traditional standard in structural applications

PVB remains the most widely used interlayer globally, and it continues to serve well in conventional framed glazing where loads are modest and the glass is not expected to contribute significant structural capacity after breakage.

Its limitations become more pronounced in open-edge conditions, in hot climates, and anywhere residual structural performance is a life-safety issue.

- Established supply chain and comparatively low cost.
- Good impact absorption and acceptable acoustic performance in many standard glazing applications.
- Not well suited to exposed edges, constant sustained load, or elevated temperatures where stiffness and shear transfer decline significantly.
- Best aligned with standard framed windows and other lower-risk applications with continuous edge support.

Technical comparison of structural interlayers

The comparison below consolidates the principal decision criteria used when specifying an interlayer for architectural laminated glass.

Feature	Standard PVB	Clear EVA	SGP / Ionoplast	Selection takeaway
Shear modulus / stiffness	Low; declines sharply as temperature increases	Medium	Very high	Use SGP where deflection control and structural coupling matter
Tensile strength	Approx. 20 MPa	Approx. 20–25 MPa	Greater than 34 MPa	SGP leads when high residual strength is required
Water absorption	High; edge delamination risk	Very low	Low	Avoid PVB in high-humidity or exposed-edge conditions
Post-breakage performance	Poor; assembly can sag or collapse	Moderate; retains fragments	Excellent; strongest fragment retention and residual support	Critical life-safety assemblies favour SGP
UV resistance	Good	Excellent when formulated with UV blockers	Excellent; low yellowing tendency	EVA and SGP outperform in demanding aesthetic applications

Feature	Standard PVB	Clear EVA	SGP / Ionoplast	Selection takeaway
Processing route	Autoclave	Vacuum laminator	Autoclave	EVA offers process flexibility where autoclave use is not preferred

Recommended interlayers by application

There is no universally best material. Selection should be tied to structural demand, environmental exposure, processing considerations, and project budget.

Application scenario	Recommended interlayer	Rationale
Structural facades and skylights	SGP	High wind-load resistance and stronger post-breakage stability.
Frameless outdoor glass railings	SGP	Higher stiffness helps the glass remain upright and perform as a barrier.
Bathroom and shower enclosures	EVA	Excellent moisture resistance and stronger exposed-edge durability.
Decorative and smart glass (PDLC)	EVA	Lower-temperature-compatible processing and strong optical clarity.
Standard framed windows	PVB	Cost-effective and generally sufficient where there is continuous frame support.
Glass floors and stairs	SGP	Safety-critical assemblies require the strongest post-breakage behaviour.

Engineering perspective: selecting the right structural interlayer

1. Load and safety level

If glass breakage and fallout could lead to injury, or if the glass itself is expected to function structurally—as in skylights, canopies, frameless guardrails, and floors—SGP should be treated as the default specification.

2. Environmental resistance

Projects in coastal, humid, wet, or exposed-edge conditions should avoid standard PVB wherever possible. EVA and SGP provide better resistance to moisture-related edge degradation and long-term visual failure.

3. Processing and cost

SGP typically carries a raw material cost approximately two to three times that of PVB, with a higher overall installed cost once processing is considered. Where the application is not structurally extreme, high-quality EVA can provide a practical compromise between performance, durability, and manufacturing flexibility.

Frequently asked questions

What is structural laminated glass?

Structural laminated glass refers to safety glass that uses an interlayer with sufficient mechanical capability to help the assembly withstand structural loads such as wind pressure, snow load, self-weight, and in some cases post-breakage loading.

What are the core differences between EVA, SGP, and PVB?

PVB is flexible and cost-effective, EVA is moisture-resistant and fabrication-friendly, and SGP is the stiffest and strongest option for structural performance.

Why is SGP typically preferred for structural glass?

Because its shear modulus is dramatically higher than that of PVB, allowing the laminate to behave more like a unified structural section under load and to retain stronger residual integrity after breakage.

Where is clear EVA most suitable?

Clear EVA is well suited to high-humidity areas, exposed-edge glazing, decorative laminates, and applications involving inserts such as fabrics, mesh, LED elements, or PDLC films.

What factors matter most when selecting an interlayer?

Load, environment, edge condition, fabrication method, visual requirements, and budget should all be evaluated together. No single interlayer is optimal for every condition.

Conclusion

A clear position emerges from the comparison. SGP is the benchmark for structural safety and should be specified wherever high loads, minimal deflection, and meaningful post-breakage performance are required.

EVA represents a strong combination of aesthetics, moisture resistance, and processing adaptability. In semi-structural, decorative, and high-humidity applications, it offers real advantages and in many cases a compelling alternative to PVB.

PVB remains the baseline solution for standard framed glazing, but its limitations become more significant as architectural glass applications demand greater transparency, exposed edges, and higher structural performance.

For project teams evaluating laminated glass systems, the correct interlayer choice is not a minor material decision; it is a performance decision that affects durability, safety, and long-term visual quality.

Synergy Group integrates laminated glass interlayer strategies into the fabrication of window and door systems, ensuring each assembly meets project-specific structural, environmental, and performance requirements.