CNCGLASS

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TECHNICAL NOTE

Safety Laminated Glass Interlayer Films

PVB, SGP, and EVA Compared

《夹层玻璃安全中间膜》

By Peter Lin

CNCGLASS · 1. Overview — Interlayer Families for Safety Laminates

Safety laminated glass is a sandwich of two or more glass panes bonded with a polymer interlayer. When the glass breaks, the interlayer holds fragments and helps the panel stay in the opening. Four polymer families appear in workshop and specification language: PVB (polyvinyl butyral), SGP / ionoplast (commonly SentryGlas® Plus), EVA (ethylene-vinyl acetate for glass lamination), and — rarely — PVC. This note compares the first three for architectural laminated-glass practice and notes where PVC is seldom used.

The families are complementary tools. PVB remains dominant in many automotive and autoclave-based architectural specifications. Ionoplast (SGP) is often chosen where higher post-break stiffness and structural or hurricane-rated façades are required. Glass-lamination EVA is widely used on vacuum-oven lines for outdoor clear safety glass and decorative insert laminates. Selection must follow the project specification, process route, and validated test plan — not a single marketing claim.

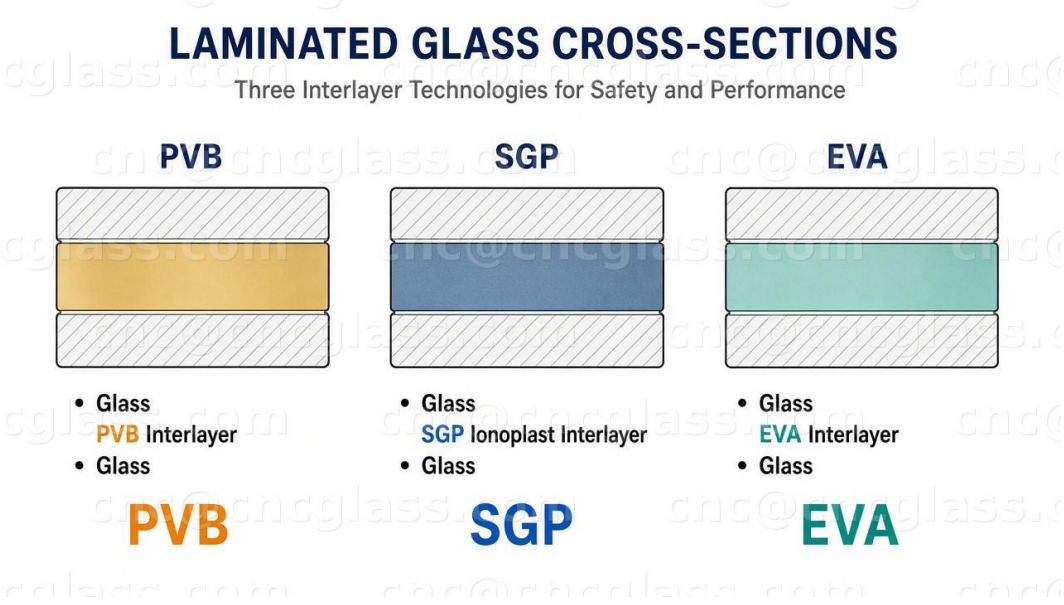

Figure 1 — Cross-section stacks: glass / PVB / glass · glass / SGP (ionoplast) / glass · glass / EVA / glass (schematic; AI-generated).

CNCGLASS · 2. PVB Interlayer Film

Chemical name: polyvinyl butyral (PVB). Well-known product families include Butacite® and Saflex® (and related brands historically associated with DuPont, Solutia / Eastman, Sekisui S-LEC®, and Trosifol®). PVB is the most widely applied safety laminated-glass interlayer worldwide.

Bonding mechanism: PVB typically adheres to glass through hydrogen bonding and contributes good adhesive strength when the film is correctly conditioned and processed. Physical notes commonly cited for plasticized PVB: no sharp melting point like a crystalline thermoplastic; relatively slow flame spread; not classed as a hazardous material in ordinary handling; refractive index close to glass (helps optical clarity). Practical caveats: PVB readily absorbs humidity and is temperature-sensitive in storage and processing — rolls are usually kept in sealed moisture-barrier packaging and laminated through autoclave (or equivalent controlled) routes.

Common architectural thicknesses include 0.38, 0.76, 1.14, and 1.52 mm; typical roll widths in the source material include 1220, 1540, 1840, 2140, and 2440 mm (supplier- and region-dependent). Color PVB systems (including Vanceva®-style layered color builds) offer many transparent / translucent combinations. Workshops have reported that some milky-white PVB builds between two tempered panes can show uneven white mottling — validate with samples on the actual tempered glass.

Packaging practice (moisture control): interlayer turns are often separated with PE film, vacuum-sealed in aluminum-foil barrier bags, and packed in plywood cases. Damaged barrier bags before use can compromise the film — do not process suspect moisture-exposed stock without supplier guidance.

CNCGLASS · 3. SGP (Ionoplast) Interlayer Film

Chemical family: ethylene / methacrylic acid copolymers (ionoplast). The best-known product name is SentryGlas® Plus, commonly shortened to SGP in Chinese and many workshop notes (historical DuPont / Kuraray ionoplast line; grade codes such as SGP5000# appear in older catalog language).

Design intent: ionoplast interlayers were developed for demanding façade loads — including hurricane-prone coastal markets where wind-borne debris repeatedly strikes curtain-wall glass. Relative to conventional plasticized PVB, supplier literature has often claimed on the order of about five times the tear strength and about one hundred times the rigidity. Treat those multipliers as directional marketing / comparative claims for conventional PVB, not as universal constants for every grade, thickness, temperature, or load case. Always verify with current datasheets and project engineers.

Bonding: ionoplast adhesion to glass (and often metals) is described as ionic in character, supporting high adhesive performance in structural laminated-glass applications. Processing is typically aligned with autoclave / high-pressure laminating routes rather than simple vacuum-oven EVA lines.

Figure 3 — Application cue: coastal / high-wind façade glazing where higher-stiffness ionoplast laminates are often considered (tasteful scene; AI-generated).

CNCGLASS · 4. EVA Interlayer Film (Glass-Lamination Grades)

Chemical name: ethylene-vinyl acetate (EVA). Glass-lamination EVA grades (thermoset / cross-linkable formulations for architectural safety and decorative laminated glass) should be distinguished from solar-module encapsulant EVA — related chemistry, different formulations and qualification paths. Historical / market product names include Bridgestone EVASAFE® and other architectural EVA families; this note does not reproduce catalog rolls or price pitches.

Workshop strengths commonly cited for glass-lamination EVA: adhesion to glass, metals, and many polymer sheets when surfaces are clean and the process window matches the grade; strong humidity resistance relative to plasticized PVB, so open-edge or lightly edged architectural laminates are often practical; vacuum-oven / vacuum-bag processing suited to outdoor clear safety glass and decorative insert builds.

CNCGLASS · 5. PVC Interlayer — Seldom Used

PVC interlayer film is listed in some older overviews but is seldom used for mainstream architectural or automotive safety laminated glass today. Specifiers almost always choose PVB, ionoplast, or glass-lamination EVA. This note does not expand PVC process guidance.

CNCGLASS · 6. Comparative Notes — Moisture, Process, Stiffness, Adhesion

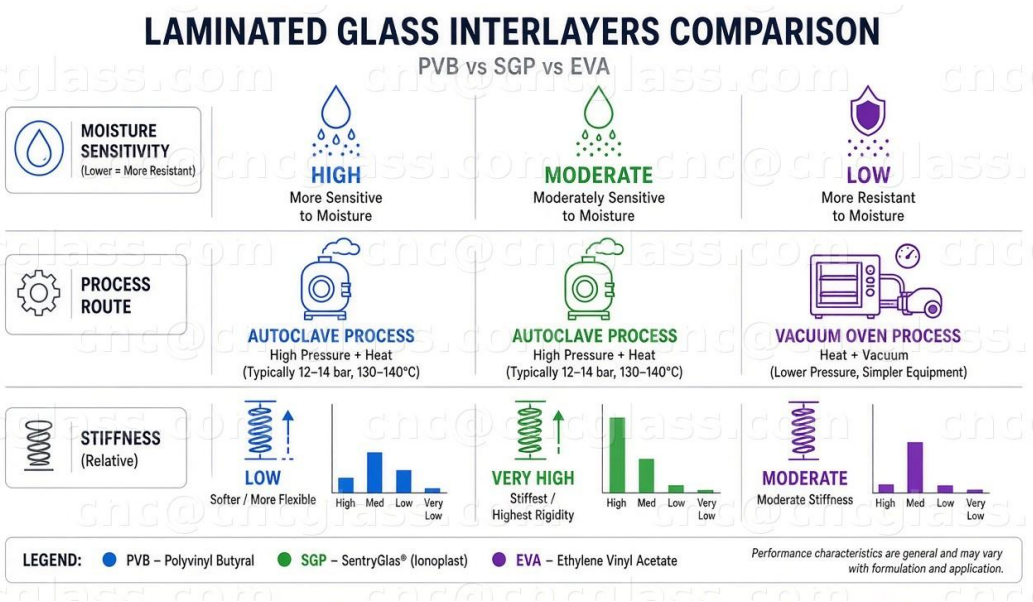

Figure 2 — Qualitative comparison: moisture sensitivity, process route (autoclave vs vacuum oven), and relative stiffness (schematic; AI-generated).

6.1 Moisture and packaging

PVB is humidity-sensitive and usually needs barrier packaging plus controlled conditioning. EVA glass-lamination grades are markedly less moisture-sensitive in ordinary workshop handling (still keep film clean and dry). Ionoplast has its own storage / open-time discipline per supplier instructions.

6.2 Process route

PVB and SGP laminates are commonly finished in autoclaves (after pre-nip / vacuum prep as required). Architectural EVA is commonly laminated in vacuum ovens / silicone vacuum bags with heat and vacuum — a lower capital route for many workshops and decorative runs. Route choice must still match the interlayer datasheet.

6.3 Stiffness / tear claims (qualified)

Ionoplast is generally much stiffer after break than conventional plasticized PVB — useful for structural glass and high-wind façades. The often-quoted "~5× tear / ~100× rigidity" figures are directional comparisons to conventional PVB and must be qualified (§3). EVA stiffness sits between soft PVB and stiff ionoplast depending on grade and temperature; do not substitute chemistries solely on a marketing multiplier.

6.4 Pull-out / adhesion data from source (with provenance)

The Chinese source includes a pull-out strength comparison measured by a method designed by the Shanghai Building Science Institute (上海市建筑科学研究院设计方法). Retained specimen values (kN):

Specimen / note	Pull-out (kN)
SGP laminate sample	36.5
SGP laminate sample	33.3
SGP laminate sample	39.2
EVA laminate sample	27.3
EVA laminate sample	29.0
Method note	**Shanghai Building Science method (source)**

Interpretation: under that source method, SGP samples fell roughly in the 33–39 kN band and EVA samples roughly in the 27–29 kN band. These are source-reported values with named provenance — not invented marketing numbers. Results depend on glass build, fixture detail, temperature, and grade. The same Chinese deck also cites a DuPont metal-to-interlayer adhesion test; the extracted text does not include usable numeric results for that chart, so no metal-adhesion figures are invented here.

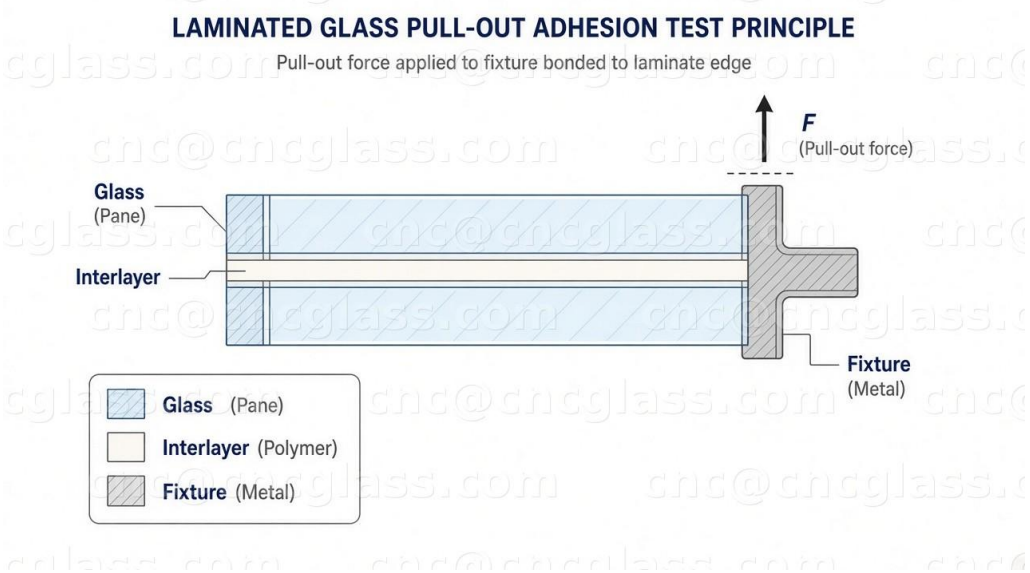

Figure 4 — Pull-out adhesion test principle (schematic only — not a lab photo; AI-generated).

CNCGLASS · 7. Typical Applications

- PVB — automotive windshields / sidelites (where specified), general architectural laminated glass on autoclave lines, acoustic and color builds.
- SGP / ionoplast — structural laminated glass, high-wind / hurricane façade systems, applications needing high post-break stiffness and strong glass / metal coupling.
- EVA (glass-lamination) — outdoor clear safety railings, canopies, and façade panels on vacuum-oven lines; indoor decorative partitions with fabric / PET / graphic inserts; open-edge or lightly edged builds where humidity resistance matters.

Figure 5 — Outdoor clear safety laminated glass: balcony railing and entrance canopy (AI-generated).

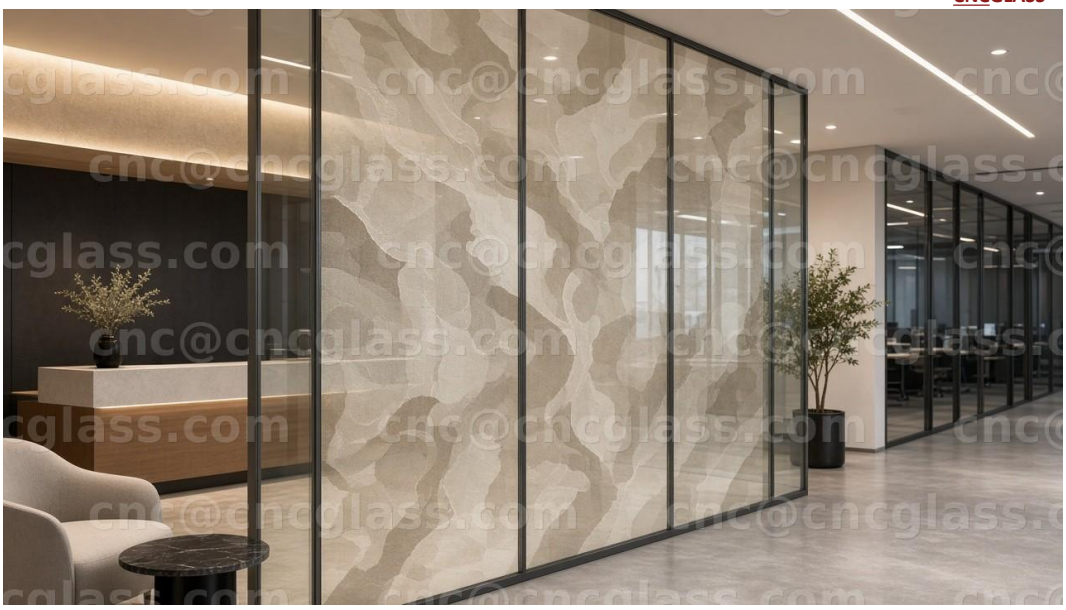

Figure 6 — Indoor decorative laminated-glass partition with insert / graphic (AI-generated).

CNCGLASS · 8. Practical Takeaway

Choose the interlayer family for the specification and process you actually run: PVB for many autoclave / automotive norms; ionoplast (SGP) when high stiffness and structural / hurricane performance are required; glass-lamination EVA when vacuum-oven economics, humidity tolerance, and decorative inserts matter.

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