

# Basic 3 kinds of laminated glass interlayer: SGP, PVB, EVA. What is the difference between them?



Glass is widely used in buildings for its transparency and optical performance as well as resistance to the environment, such as wind, rain and temperature variations, etc. However, as basic material, it is inherently brittle. A laminated glass interlayer is generally the preferred way of overcoming these limitations.



As a complex composite material, its properties can be changed considerably by different interlayer materials. The interlayer is laid between plies of a glass of the required thickness, with multiple sheets of interlayer being used to achieve the required thickness when required. Extreme heat and pressure are then applied to the assembled composite, in a controlled manufacturing process that bonds the layers of interlayer materials and glass together. Should the glass break, the glass fragments should be held in position by the adhesive bond between the interlayer and glass. The ductility and toughness of the interlayer will also play a vital part in delivering the acceptable post-fracture performance of the laminate.

To illustrate the effect of these interlayers in more detail, the below video shows a 69 kg impact on a 19mm tempered glass, a 21.52mm glass panel with a 1.52mm PVB interlayer, and then a 21.52mm glass panel with a 1.52mm SGP interlayer.

PVB, SGP, EVA are three common types of laminated glass interlayer that exist and are used by glass processors to produce laminated glass.

The selection of a particular interlayer is based upon a host of parameters including availability, durability, cost of material and manufacturing equipment, optical clarity, and blast performance.

## **POLYVINYL BUTYRAL (PVB) – What is a PVB interlayer**

PVB is one of the most popular and commonly used interlayers within architecture. Its optical clarity, flexibility, and ability to adhere to many surfaces make it a primary interlayer for glass manufacturers. Due to its relatively high durability, predictable mechanical behavior, and ease of manufacture. Many different grades of PVB exist, having been modified to achieve a range of structural properties, impact resistance, and acoustic performance.

For cost-effective manufacture of [PVB laminated glass](#), in most situations, an autoclave must be used which applies both heat and pressure as part of a controlled cycle. The laminated panel is first assembled by placing a PVB interlayer between two or more pieces of glass within a cleanroom. This 'sandwich' of different materials is initially de-aired and stuck together using a vacuum or series of rollers before the laminate is placed within an autoclave and subject to approximately 10 bars of pressure and heated to approximately 130°C to produce the final laminated product.



*lamination room*

## Performance specification

- **PVB Interlayer Thickness** □ 0.38mm, 0.76mm, 1.14mm, 1.52mm, multiple of 0.38mm.
- **PVB Interlayer Color:** transparent, extra clear, black, blue, bronze, white, red, yellow, orange, purple, etc.
- **PVB Glass Shape:** flat laminated glass, curved laminated glass.
- **PVB Glass type:** float, tempered, fluted, patterned, reflective, Low-e, mirror glass, etc.

## PVB Interlayer Glass Applications

- [Residential Doors & Windows](#)
- Internal Glass Balustrades & Glass railing or fence
- Overhead Glazing – Skylights or Canopies
- Internal Glass Partition

- Glass Floor & Stair
- [Shower Door](#)
- Curtain Wall & Facade
- [Bullet-proof glass](#)



*PVB interlayer glass fence*

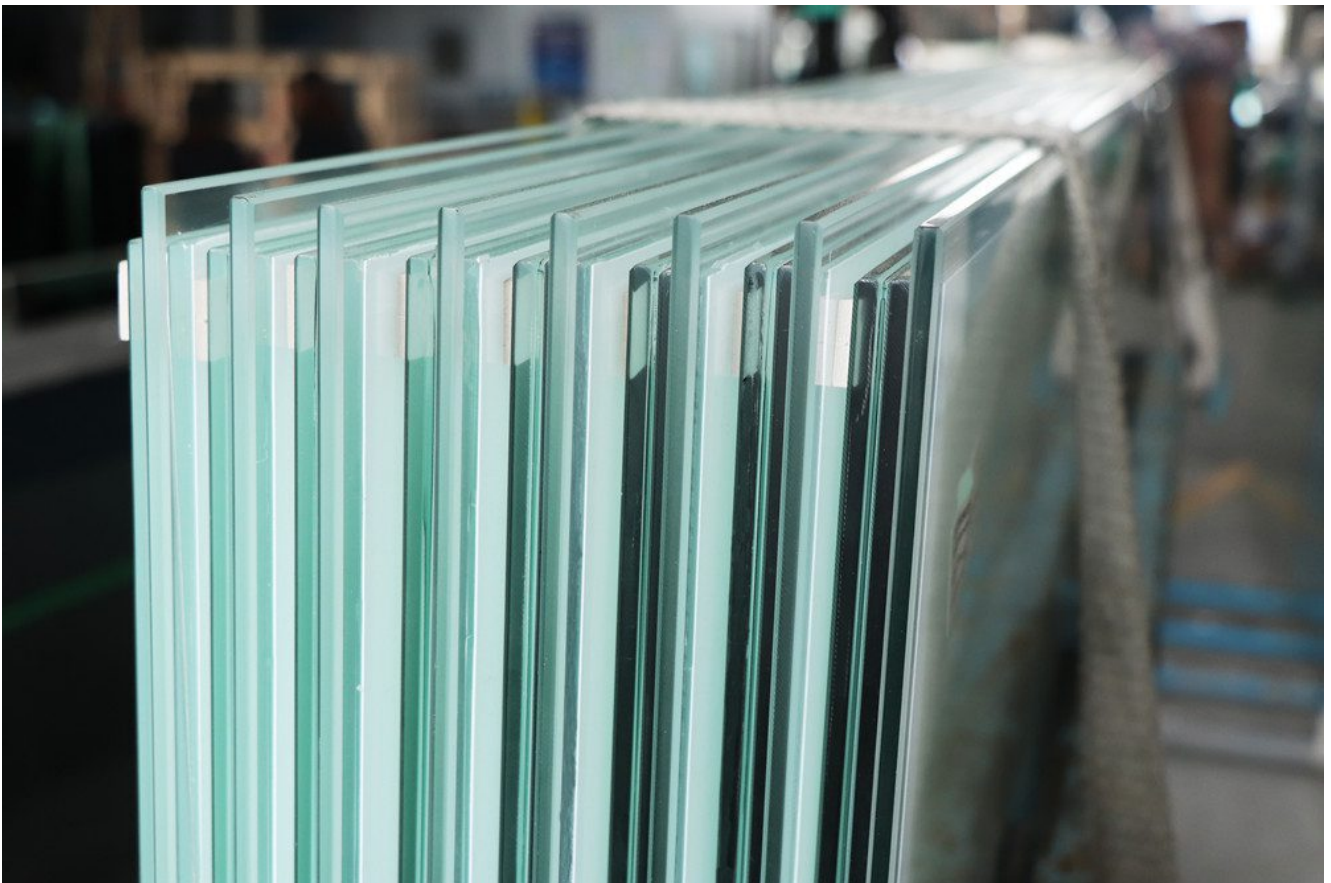
## **PVB Interlayer Glass Benefits**

- 99% filtering of harmful UV rays
- Available in a variety of thicknesses
- Acoustic performance, sound insulation
- Customizable- mix and match PVB interlayers
- Cost-effective laminate
- High Transparency
- Cold Resistance
- Impact Resistance





*Tinted clear PVB interlayer glass*



*overlap 6mm+6mm+6mm white-colored PVB interlayer bulletproof glass*

## **SentryGlas Plus (SGP) – What is an SGP interlayer□**

SGP laminated interlayer is a high-performance sandwich material developed by DuPont Co. Originally developed for the

security and hurricane glazing markets, SGP interlayer is now being specified for applications where high-performance glass is required.

SGP interlayer is stronger and more rigid than conventional laminating materials, creating safety glass that protects against storms, impacts, and blasts. The interlayers become an engineered component within the glass, holding more weight. SGP interlayer is less susceptible to moisture, weathering, and edge defects than other interlayers.



*the residual strength of multi-layer SGP laminated glass after breaking*

## Performance specification

- **SGP Laminated Interlayer Thickness** □ 0.76 mm, 0.89 mm, 1.52 mm, 2.28 mm, etc.
- **SGP Laminated Interlayer Color:** Clear, translucent.
- **SGP Glass Shape:** flat laminated glass, curved laminated

glass.

- **SGP Glass type:** float, tempered, fluted, patterned, reflective, Low-e, mirror Glass, etc.

## SGP Interlayer Glass Applications

- [Internal & External Balustrades](#)
- Security Glass & Explosion-proof glass
- Floors, Stairs, and Landing Panels
- [Facades](#)
- Zoo Enclosures and Aquariums
- Overhead Glazing – Skylights or Canopies
- Safety & Security Glazing

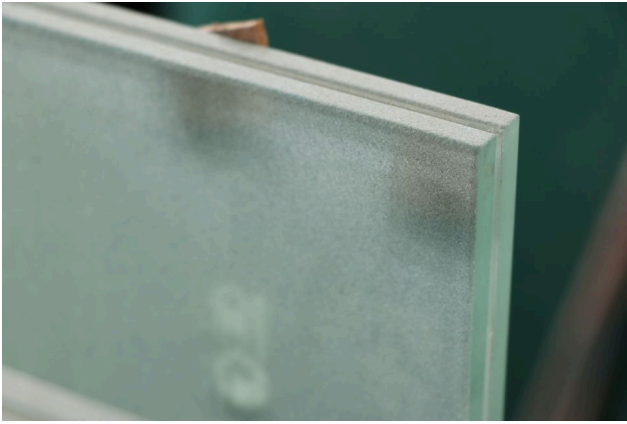


*SGP interlayer glass floor*

## SGP Interlayer Glass Benefits

- Can be used in external, exposed edge applications
- Superior edge stability
- Offers the highest level of structural performance





*frosted clear SGP interlayer glass*

## **SGP vs PVB:**

- 1. Excellent mechanical properties and high strength. At the same thickness, the SGP interlayer bearing capacity is twice that of PVB; under the same load and thickness, the bending deflection of SGP glass is one-quarter of PVB.
- 2. Tear strength. At the same thickness, the SGP interlayer film has a tear strength of 5 times that of PVB and can be bonded to the glass in the case of tearing without causing the entire glass to fall.
- 3. Strong stability, moisture resistance. SGP glass is colorless and transparent, anti-ultraviolet. After long-term sun and rain, it is not easy to turn yellow, and the yellowing coefficient is less than 1.5. However, the yellowing coefficient of PVB interlayer film is 6~12. Therefore, SGP is the darling of ultra-clear laminated glass.



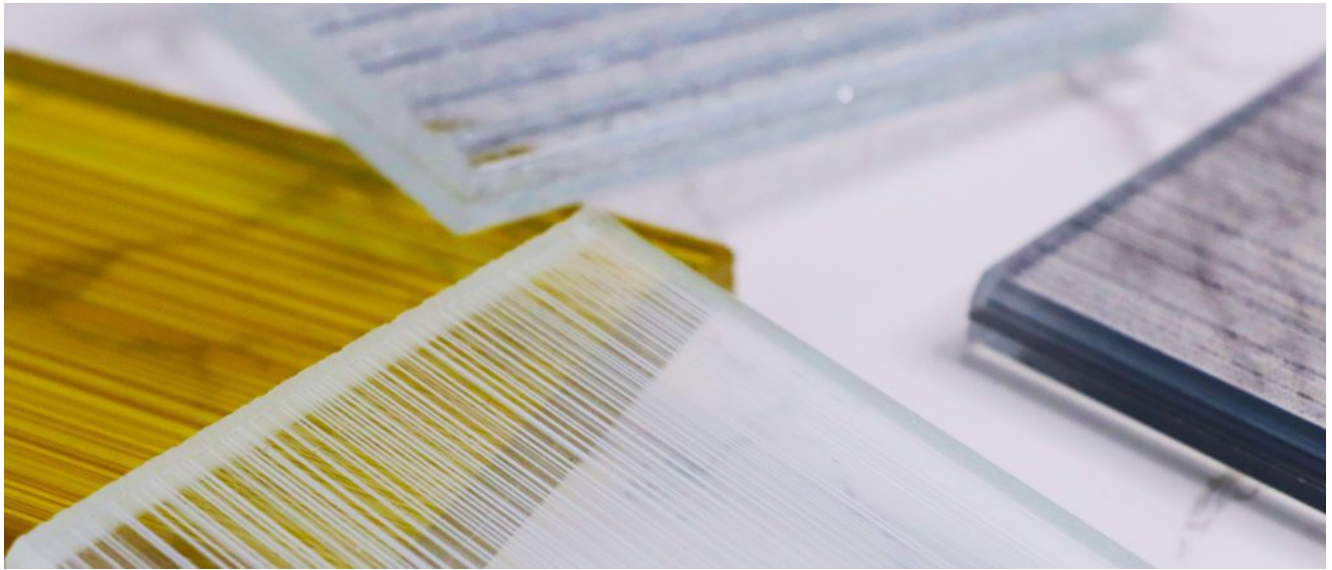
*6mm+1.52PVB+6mm clear glass VS 6mm+1.52SGP+6mm+1.52SGP+6mm clear glass*

## **Ethylene Vinyl Acetate (EVA) – What is an EVA interlayer**

PVB interlayer has been the reference material for laminated glass interlayer in the building construction and transportation industries for many years, However, Ethylene Vinyl Acetate (EVA) interlayer is challenging current PVB glass interlayer as a laminated material because of some advantageous properties. In fact, is a good material also for such types of applications, and is able to fulfill all the key properties that are required for PVB glass interlayer today. Not just that, it is also able to overcome some of the drawbacks of the PVB, outperforming the PVB glass interlayer.

EVA interlayer is high in moisture resistance and can be used in both external and internal glazed applications when the edges are exposed. EVA interlayer adheres to glass and other materials better than PVB and is available in many colors making it the ultimate selection when design innovations are a requirement. EVA interlayer allows distinctive products such as fabrics, paper, decorative wire mesh, printed PET films, and photovoltaic cells (solar panels) to be combined in the

glass build-up. EVA interlayer is combined in our laminate glass with a PDLC film providing switchable privacy glass.



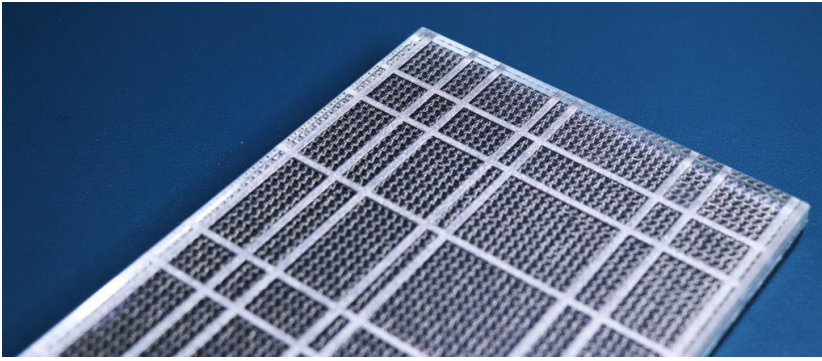
*mesh & fabric EVA laminated Glass for decorated*

## **Performance specification**

- **EVA Laminated Interlayer Thickness** 0.25 mm, 0.38 mm, 0.50 mm, 0.76, etc.
- **EVA Laminated Interlayer Color:** transparent, extra clear, frosted, black, blue, bronze, white, red, yellow, orange, purple, etc.
- **EVA Laminated Glass Shape:** flat laminated glass, curved laminated glass.
- **EVA Laminated Glass Type:** float, tempered, fluted, patterned, reflective, Low-e, mirror glass, etc.

## **EVA Laminated Glass Applications**

- [Switch Glass / Smart Glass](#)
- Decorative Laminated Glass
- Solar Panels
- [Mesh & Fabric Laminated Glass](#)



*metal EVA laminated glass*

## **EVA Laminated Glass Benefits**

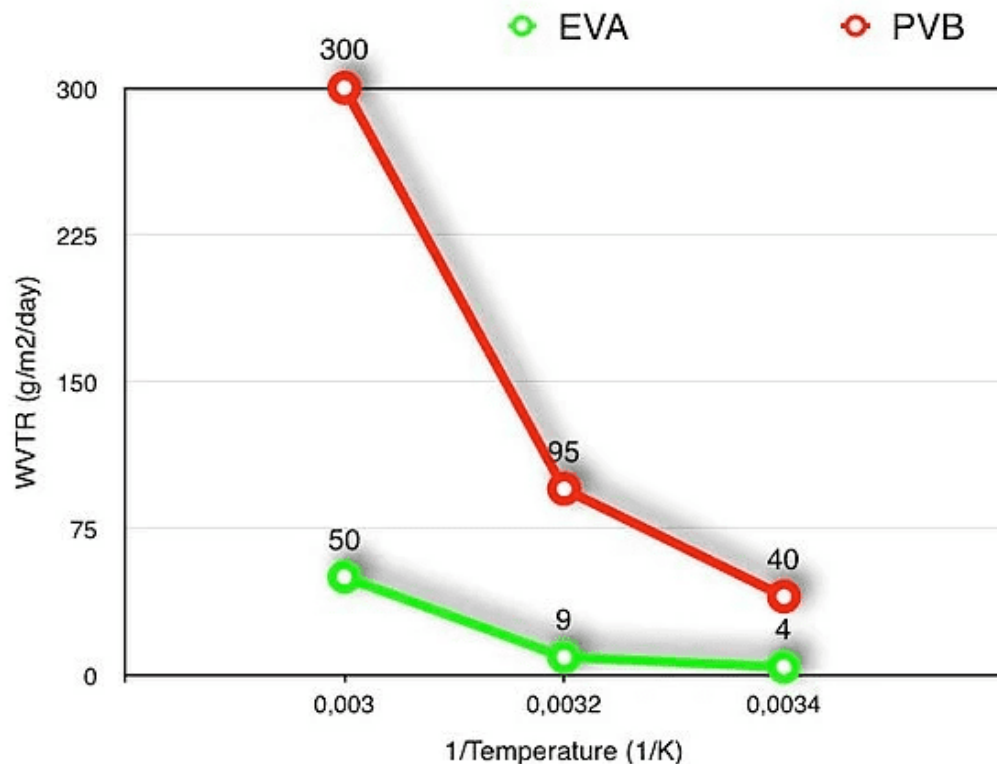
- Can be used in external, exposed edge applications
- Customizable: add metal materials to the laminated glass
- Good fluidity of the film layer: can be subjected to a process such as wire drawing and engraving in the film layer to produce a beautiful decorative glass with a pattern

## **PVB vs EVA**

- 1, Better resistance to moisture, the chemical composition of the cross-linking of EVA interlayer allows the internal molecules to generate three-dimensional connections, thus ensuring an additional degree of protection for all architectural elements exposed to exceptional conditions, such as high temperatures, high humidity, and extreme weather conditions.
- 2, Better optics transparency, values close to the extra clear glass.
- 3, EVA interlayer is a cost-effective option compared to others.
- 4, Due to the good fluidity, can laminate some metal materials or silk in the middle interlayer



- 5, One of the main differences between EVA and PVB is their water vapor transmission rate, coming from natural water or weather humidity. The following figure compares the Water Vapor Transmission Rates of the two materials at the same range of temperatures:



*PVB has an average of 8-9 times higher tendency to permeate water than EVA*

## PVB vs SGP vs EVA – Interlayer Summary

	Thickness (mm)	Cost	Processing Method	Color	Typical application
<b>PVB</b>	Multiples of 0.38, 0.38, 0.76, 1.52, etc	\$	Autoclave	★★	Commercial façade glazing Glass balustrades Blast-resistant glazing

<b>SGP</b>	0.76 , 0.89, 1.52, 2.28, etc	\$\$\$	Autoclave	★	Windows subject to impact Large unsupported glass panels Overhead canopies
<b>EVA</b>	0.38, 0.76, 1.52, etc	\$	Hotbox vacuum or autoclave	★★★	Laminating photovoltaic cells <a href="#">Mesh &amp; Fabric</a> <a href="#">Laminated Glass</a> PDLC smart glass

Shenzhen Dragon Glass offers all of the above interlayers, more complex selections combine toughened, heat-strengthened glass or specific interlayers in the laminated make-up.

Our technical team can be custom-made to specification and size, if you are working on a project and would like assistance, please check more information on our Laminated glass product range OR contact our friendly sales team.