

# EXTRALUM

## Technical Bulletin.



Laminated glass is also known as safety glass. As the name suggests, laminated glass is composed of multiple layers of glass joined together for a PVB interlayer.

The PVB interlayer gives the glass additional safety against breakage, as the broken glass fragments are remaining attached to it.

Windshields or anti-theft and bulletproof glass belong to this type of glass. This flexibility makes laminated glass an indispensable element in contemporary architecture and design.

### **VILAX, a product certified by INTECO.**

VILAX® laminated glass is manufactured under the strictest quality controls, ensuring compliance with ANSI Z97 requirements for safety glass. The INTECO Conformity Mark Certificate validates both the manufacturing process and the safety performance properties of the final product.



VILAX laminated glass is subjected to impact testing. This test is intended to reproduce the effects of a possible impact of a person against a glass.

To meet the impact requirements, according to ANSI Z97, a glass must meet at least one of the following conditions: not break or break safely. It is understood that a glass breaks safely when:

- The resulting fragments are small and have no sharp edges.
- When, still broken, there is no detachment from the broken pieces of the cloth and therefore the risk of cutting is eliminated.

## Processing.

PVB is a flexible material that absorbs humidity from the environment (hygroscopic). For this reason, it should be stored under controlled temperature and humidity conditions.

PVB sheets are usually transparent, but there is also color PVB, opaque and translucent.

## Manufacturing:

VILAX laminated glass is manufactured in a horizontal laminate line, using the latest technology available on the market. In general terms, the process can be described as follows:

- The assembly takes place at the exit of the washing machine.
- The PVB sheet is placed on the glass. The second sheet of glass, held by a suction cup, is then placed on the PVB.
- The set is driven into a preheating furnace.
- The units are heated to an approximate temperature of 70°C.
- The air is removed by partial destruction the surface of the film. The edges are immediately closed in order to prevent possible air entry during the final operation in the autoclave.
- Pre-laminated glass is driven to the autoclave, where it is subjected to controlled pressure and temperature conditions to achieve full adhesion between the glass and the PVB.

Cycle times are based on the thickness of the units. It is logical that a glazing with more thickness needs a significantly longer time to wait for the necessary temperature to reach the inside of the unit and, in addition, allow proper and complete cooling at the end of the cycle

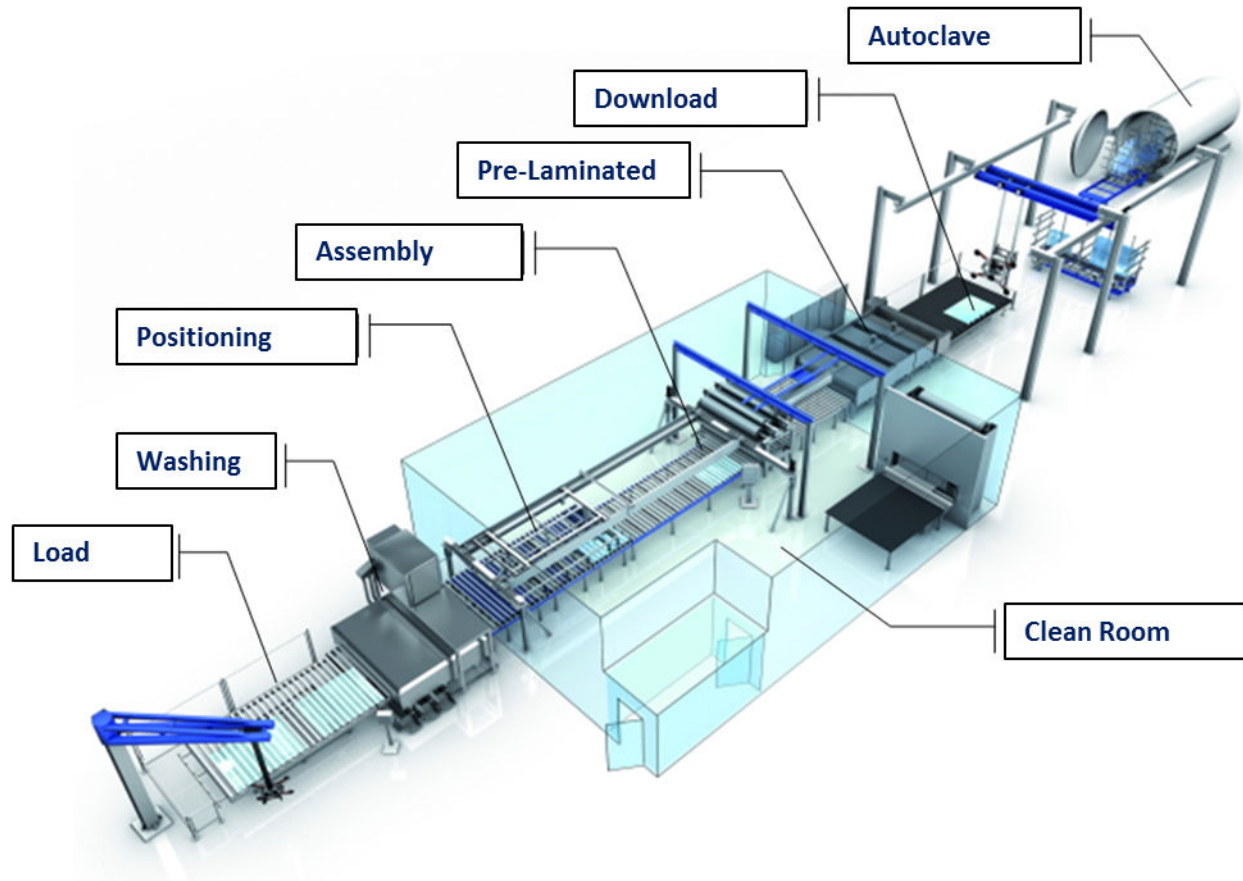


Image 1: Manufacturing process

## Nomenclature.

There are many ways to describe laminated glass. One of the most common worldwide is to describe it in the form of **XY.Z**

Where:

X = Outer glass thickness

Y = Internal glass thickness

Z = Number of PVB layers, assuming that the total PVB thickness consists of the sum of layers of 0.38mm.

PVB Thickness	Number of layers 0.38
0.38	1
0.76	2
1.14	3
1.52	4

Example:

$$33.4 = 3\text{mm glass} + \text{PVB } 1.52\text{mm} + 3\text{mm Glass}$$

Laminated glass can be classified as symmetrical when the glass that makes up it are the same thickness and asymmetric, when composed of glass of different thicknesses.

## Properties.

1. The best option for protection:
  - a. Eliminates injuries due to glass fragments.
  - b. Eliminates the risk of people falling as they pass through the glass.
  - c. If broken, the glass remains in its frame until replacement.
2. It can provide security against hurricanes, vandalism, bombs, bullets and others.
3. Blocks 99% of harmful UV rays, preventing discoloration and aging of organic materials.
4. Low visual distortion:
  - a. Normal laminated glass is not optically distorted.
  - b. When using heat-treated glass in a laminate (tempered or heat-hardened), optical distortion is increased due to the waviness of the glass.
5. Solar and heat Control:
  - a. When solar control glass is incorporated in its composition, direct heat transfer from the outside to the inside is reduced.
6. Noise reduction:
  - a. Laminated glass is extremely effective in reducing noise transmission, thanks to the damping capacity of the two glasses and the PVB film.
  - b. Simple laminated glasses present a noise reduction between 33dB and 41dB approximately, provided that all the complementary elements of the construction are in accordance with this purpose.

Before recommending acoustic control glass, it is very important to establish the fact that glass will achieve its best potential performance only if all building elements are designed for the same purpose. This means that window frames, ceiling materials, and walls are indicated to reduce noise and that there are no cracks or unsealed cracks.

## Types of Glass.

Glass that can be laminated:

- Clear or tinted float
- Pyrolytic Coated Glass
- Low E Coated Glass
- Acid-Etched Glass
- Mirror (contact of the paint layer with the PVB is not recommended)
- Sandblasted (contact of the sandblasted surface with the PVB is not recommended)
- Heat treated (tempered, heat strengthened)
- It can be used in insulated glass (DVH) glass applications.

## Applications.

Laminated glass should be recommended for all applications that require a level of safety and security. For example, on glass floors, bridges, stairs or roofs.

## Identification of Faces.

The identification of the face that will have contact with the PVB is of utmost importance, as this will vary the performance of the glass.

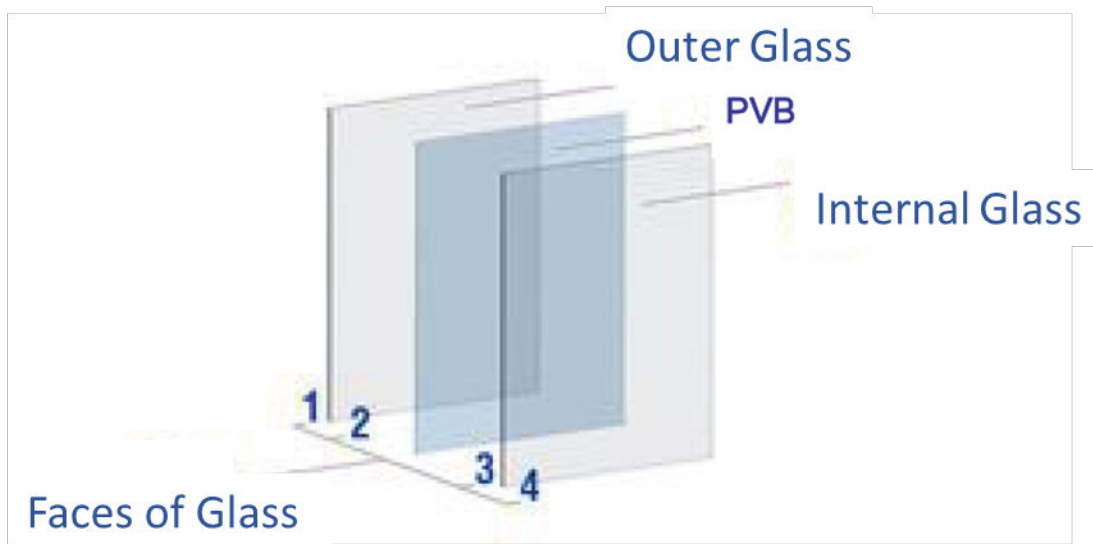


Image 2: Location of glass faces.

For more information it is recommended to consult the TB-014 "Glass Coated Layer Location"

## Laminate Configuration.

Laminated glasses are not limited to 2 glasses. Their applications are as wide as producing bulletproof glass and making combinations with DVH.

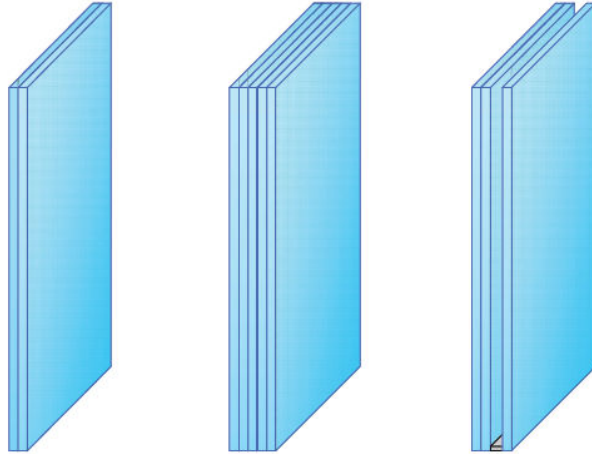


Image 3: Laminated configurations. Standard Laminated, Multi-laminated, Laminated-IG

## Special Considerations.

Installation, cleaning and storage are factors that determine the shelf life of the product.

For example:

- Prolonged exposure of the edges to water should be avoided.
- The glass must be supported on at least two sides.
- Sealants containing organic solutions should not be used as they may cause delamination of the edges.
- Laminated glass can be cut at the installation site, as long as it does not contain heat treated glass (tempered or heat Strengthened). Care must be taken and ensure that no damage to the edges of the glass occurs.

If you have any questions, consult the Sales Department of Extralum, S.A.