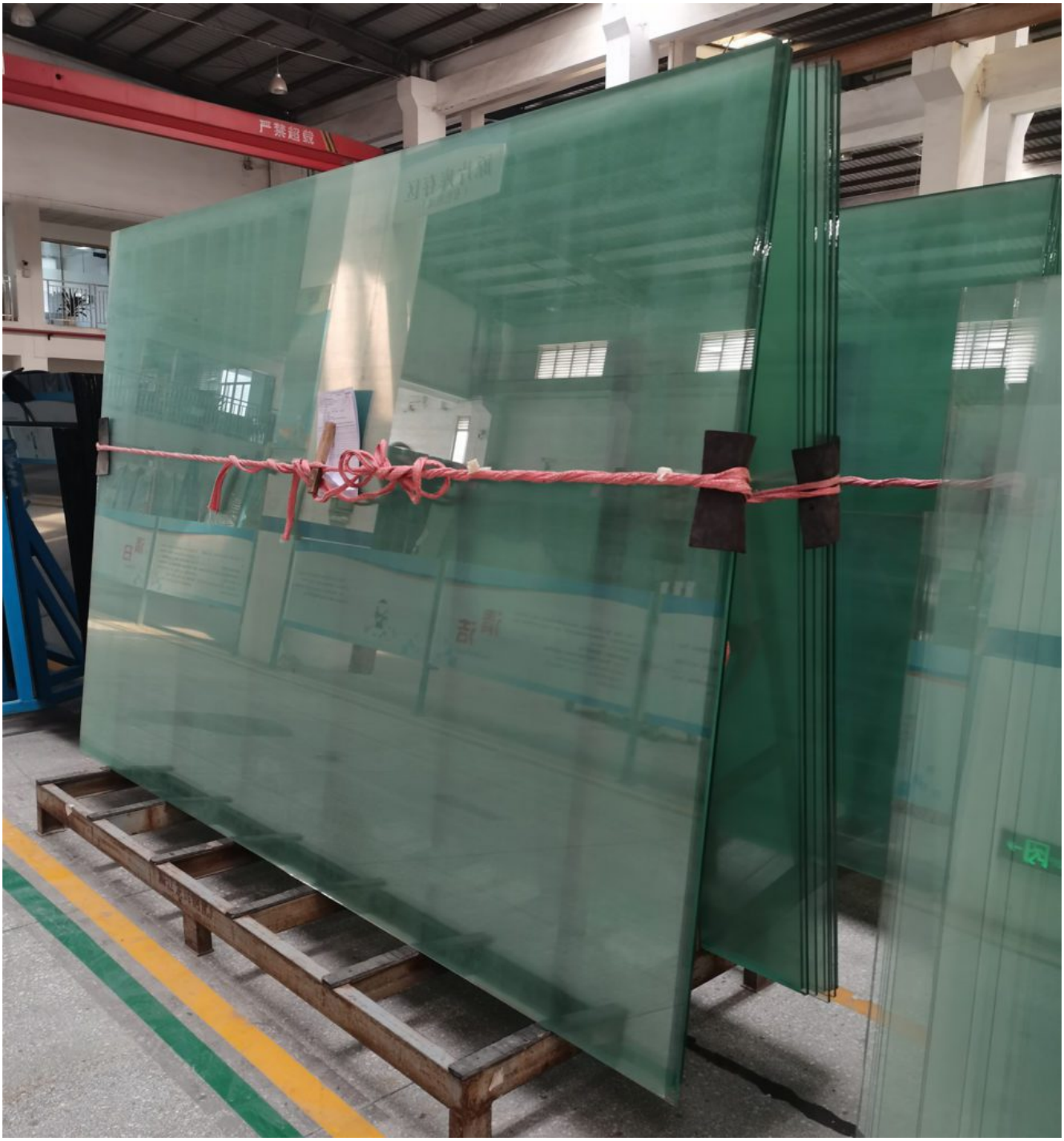
Float glass vs tempered glass vs laminated glass – ultimate comparison in 2022

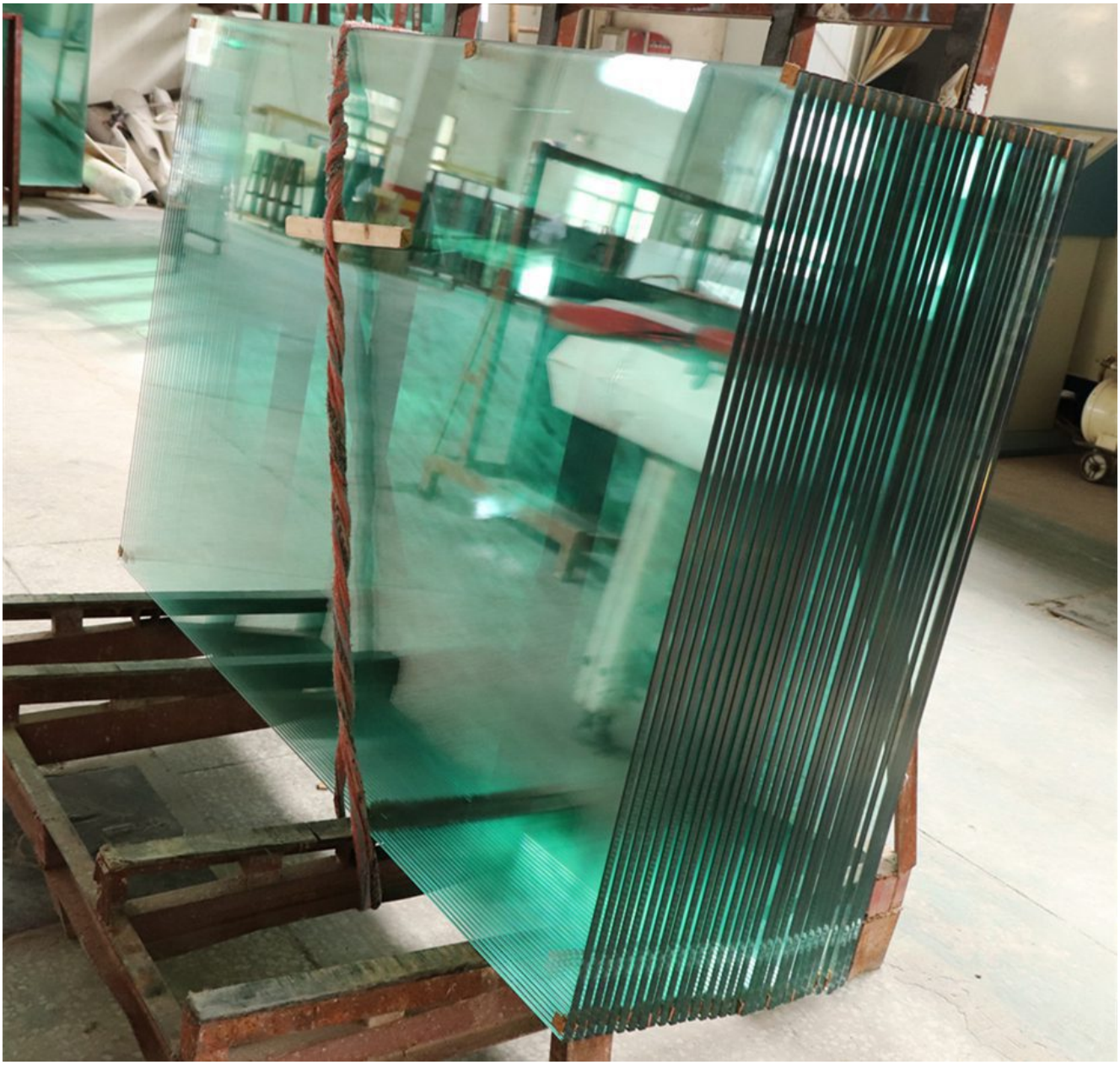
Do you know the difference between float glass vs tempered glass and tempered glass vs laminated glass? You will know the answer in the article. Glass is the most important and common construction building material in both residential and commercial settings. Nowadays, there are so many glass types because of the different glass manufacturing processes and each one offers several different features. How will you choose from those? Today we will share the main 3 types of glass, their pros and cons, and their applications to help you figure out the difference between laminated and tempered glass.

What Are Float Glass, Tempered Glass, and Laminated Glass?



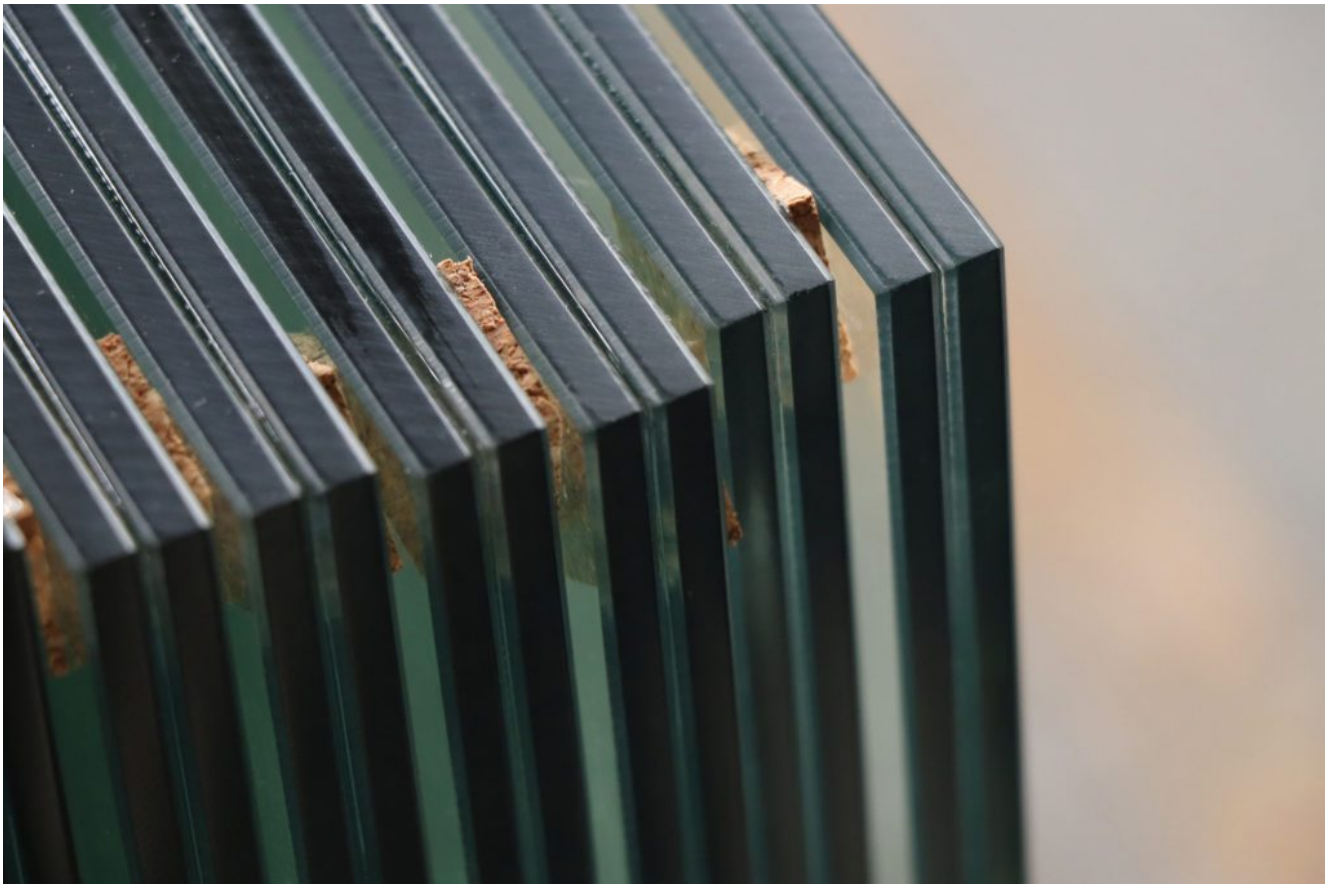
Float Glass

Float glass also called anneal glass or plate glass, is ordinary glass. Anneal glass is mostly tended to be processed into different types of glass products to achieve desired performances or applications.



Clear Tempered Glass

Tempered glass, or toughened glass, is made from annealed glass by heat treatment. Generally, tempered glass is 4 to 6 times stronger than normal glass.



PVB Laminated Glass Railing

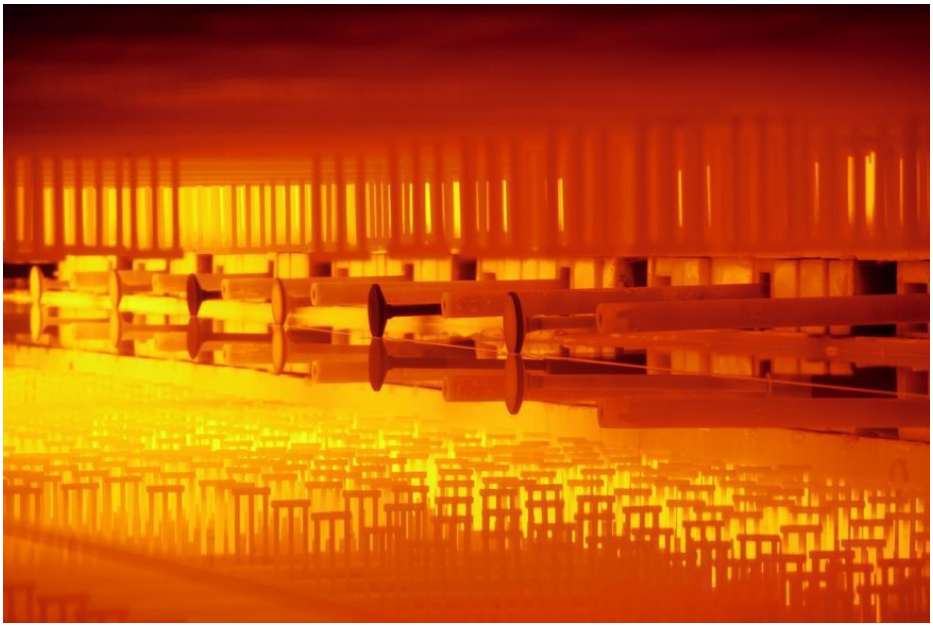
Laminated glass, a type of shatterproof glass, is made of two or more layers of glass sheets, and most of the interlayers in the middle are PVB (polyvinyl butyral). PVB Laminated glass is also known as “safety glass” or “glue glass”

The Glass Manufacturing Process Difference

1. Manufacturing Process of Float Glass

Float glass manufacturing process is conducted by pouring the molten glass from a furnace into a chamber that contains a bed of molten tin with protective gas (N_2 and H_2). Since the molten glass has a lower density than liquid tin. It floats on the tin, spreads out, and forms a level surface. The glass ribbon is pulled off the bath by rollers at a controlled speed.

Variation in the flow speed and roller speed enables glass sheets of varying thickness to be formed. This method gives the glass sheet uniform thickness and very flat surfaces



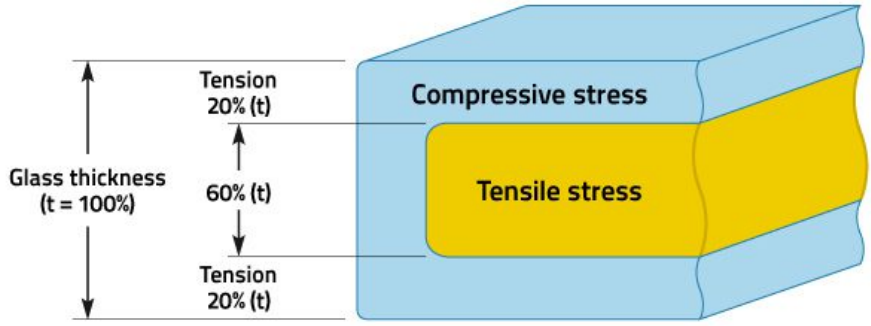
molten glass

2. Manufacturing Process of Tempered Glass

Manufacturing process of toughened glass is by heating annealed glass in a tempering furnace at a high temperature of over 600°C, then it is quickly cooled by using high-pressure air blasts, the procedure called “quenching”. This cools the outer layers of the glass much more quickly than the internal layers, so when the inside cools, it pulls away from the outer layers. This keeps the center in tension while the outer surface goes into compression. This is how tempered glass gets its strength.

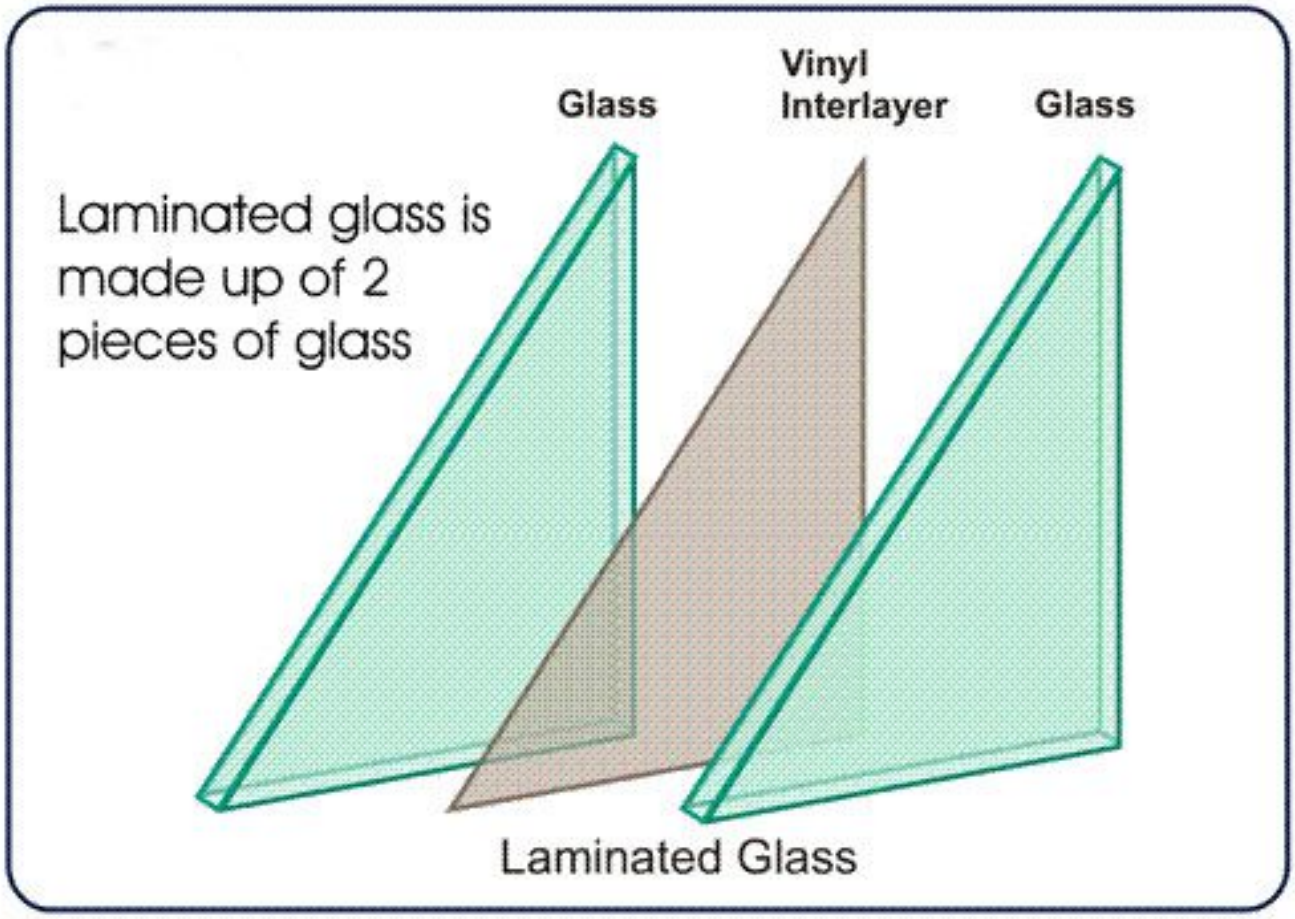
Production Process of Toughened Glass

Tempering Furnace



Tempered Glass Tension & Compression

Because of the stress in the glass, any cracking will cause the whole glass panel breaks into lots of small tempered glass shatter, which are small and unsharp glass pieces. So any further process like drilling, cutting, and grinding, is not available after tempering.



3. Manufacturing Process of Laminated Glass

PVB laminated glass is produced by adhering two or more layers of glass together with a PVB interlayer.

1. The glass panes are required to be washed and dried thoroughly.

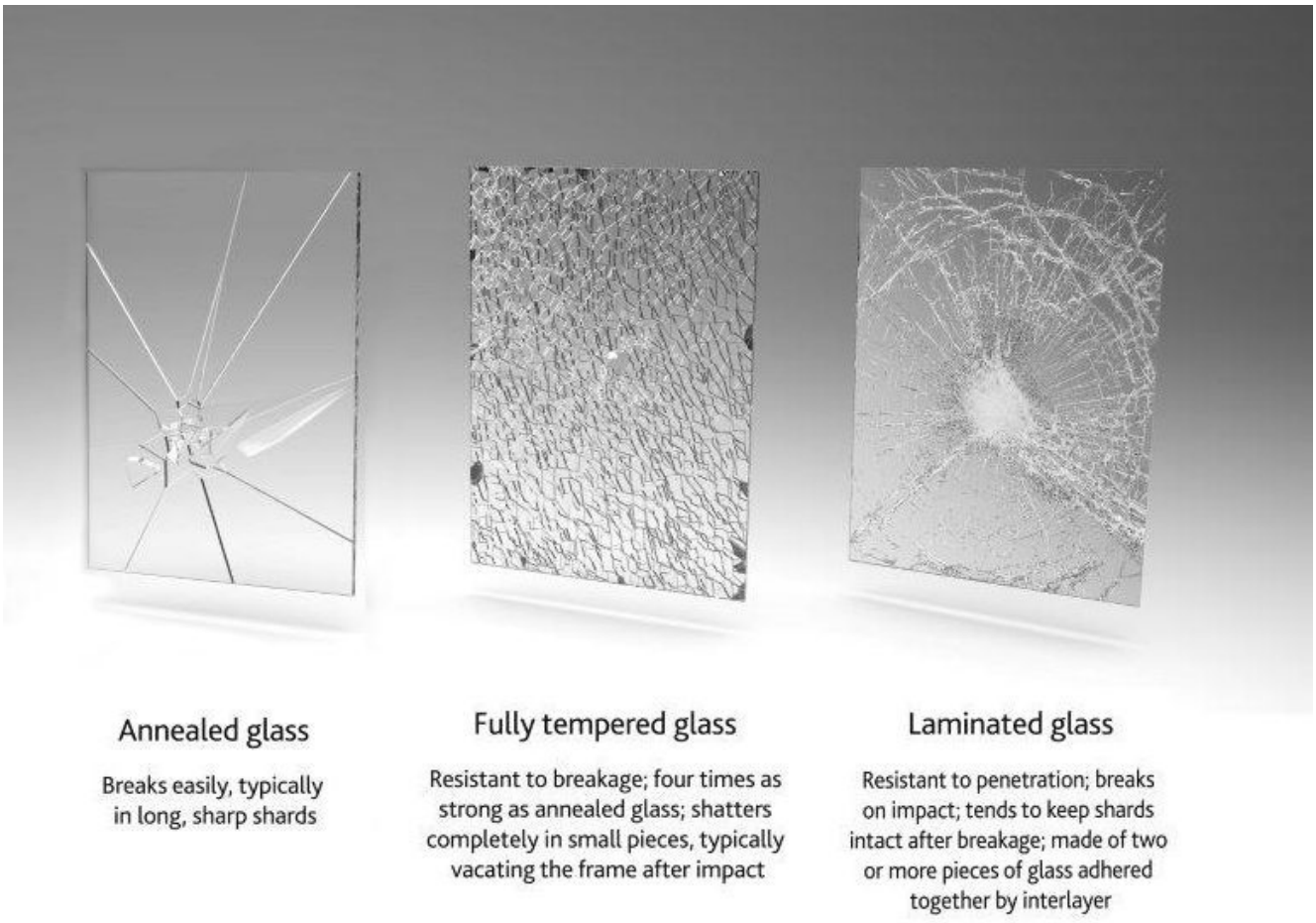
2. A slightly bigger interlayer will be put between two pieces of glass. The process must be conducted in a clean and dust-free room with a conditioned temperature and humidity.

3. The glass will be preheated.

4. The nipped laminate glass is transferred to the autoclave where there is high pressure and temperature. The process will eliminate air bubbles from the glass layers forming a tough seal.

5. The glass panels and the interlayer will be bonded permanently, and they still stay in high transmittance.

Even if PVB laminated glass breaks, the sharp pieces still remain on the glass panels and are less likely to drop and hurt anyone. Both laminated glass and tempered glass are considered safety glass.



Different Types of Glass When Broken

The Strength Difference

- Float glass is the basic glass, which means that it has the lowest strength comparing other processed glass products.

- Toughened glass after being heated and rapid cooling process, is 4 to 6 times stronger than float glass.

- Laminated float glass is basically a glass sandwich that is strong. PVB laminated glass withstand the high impact of a rock or even a bullet without shattering and

falling off the frames.

- As we mentioned before, tempered glass is much stronger than float glass. When it comes to tempered laminated glass, its strength will be higher. It can be considered an enhanced version of laminated float glass.

Application Difference

The use of a single panel annealed glass in construction has a potential hazard. Because when the glass breaks, it becomes large sharp fragments that can cause serious injury or death. We don’t suggest using float glass directly in construction.

Applications of tempered glass

Uses for tempered glass are wider. It is an ideal option for both commercial and residential building constructions. It can be used as a single panel because of its high strength and unsharp shatters which provide better protection and safety. The glass can be used for building large windows, doors, sliding doors, staircases, and shower enclosures, etc.

Applications of PVB laminated glass

Laminated glass features are way more than tempered glass, perfectly solving the problem of float glass with sharp pieces and tempered glass with small shatters because all of the fragments will remain on the glass panels, which can avoid potential injuries when the glass is broken.

Uses for laminated glass are much more. It can be used for glass facades, windows, doors, or in any interior and exterior applications. Also commonly used as protection in structures, such as showrooms, museums, aquariums, etc.

Breaking laminated glass is difficult, so it is suitable for hurricanes and tornadoes areas, as well as burglary and criminal prone areas, like jewelry shops, banks, and money-exchange centers. Bulletproof glass is made from laminated float glass.

Laminated tempered glass has almost the same applications as laminated float glass. Most of the time, their applications are interchangeable.

The Pricing Difference

- Float glass is the cheapest among those types of glass.
- Tempered glass is slightly expensive.
- Laminated float glass, like PVB laminated glass, is more expensive than toughened glass because laminated glass process requires much more production procedures, the extra cost makes its price high.
- The price of laminated tempered glass price is almost the same as laminated float glass. That is because the tempered glass manufacturing process cost is not high.

Price comparison: float glass < tempered glass < laminated float glass < laminated tempered glass

The Pros and Cons

Type of Glass	Advantages	Disadvantages
Float Glass	It is cheap. The glass also has a pretty flat and smooth surface. Float glass is always available for cutting, grinding, and drilling.	The sharp glass fragments are very dangerous and may cause serious injuries
Tempered Glass	As for safety glass, it is 4-6 times stronger than float glass. Tempered glass can withstand temperatures up to 470 degrees Fahrenheit, so it is ideal for kitchen appliances. The heat treatment process makes tempered glass strong and also makes it scratch-resistant and still remains in high transmittance.	Sometimes spontaneous glass breakage will occur caused by nickel sulfide. Its edges are very vulnerable, any impact on the edges will break tempered glass easily. It can’t be cut, ground, or drilled any longer.
Laminated Float Glass	It is stronger than single panel float glass and has higher impact resistance. Laminated glass has better sound resistance and UV protection that could keep your furniture, carpets, and curtains from fading.	It is pretty expensive because of laminated glass process requires more procedures.

Laminated Tempered Glass	It has much higher impact resistance, and with the same features as laminated float glass, like sound resistance, and UV protection.	The same features as tempered glass, spontaneous glass breakage, and vulnerable edges, and unavailable for further process.

A brief comparison of safety, strength, and security

- Float glass vs tempered glass, comparing safety and strength, tempered glass wins.

- Tempered glass vs laminated glass, comparing security and impact resistance, laminated glass wins.

Conclusions

Both tempered glass and laminated glass are used as safety glass. But their different glass features may confuse you. Here are the answers for choosing safety glass.

Generally, tempered glass is already strong enough and can resist high impact. It’s suitable for most residential and commercial buildings. However, if you care about the scattering glass fragments, laminated glass should be used.

When UV resistance, security, and soundproofing are one of your considerations, laminated glass is your best choice.

FAQ

1. Is it possible to avoid spontaneous glass breakage?

Using extra clear glass or doing a heat soaking test could lower the rate or eliminate it.

2. Do you supply curved glass?

Yes, we can manufacture curved tempered glass and curved laminated glass.

3. Do you have other laminated glass except for PVB laminated glass?

Yes, we can produce EVA and SGP laminated glass.

4. What is the thickness of PVB laminated glass?

There are many combinations, common thickness 6.38mm, 8.76mm, 11.14mm, 13.52mm, 21.52mm, etc.

Shenzhen Dragon Glass is a leading tempered and laminated glass manufacturer in China. We are dedicated to supplying high quality glass products. Please contact us if there are any questions.