

Thermally tempered glass VS Chemically strengthened glass

Glass is now one of the most widely used material in modern society,you can always easily find glass in your daily life.From windows&doors,to auto,shower doors,to electronic equipment:TV,computer,Mobile phones,etc,and even glass cups,decorations and lights.

Glass itself is brittle material and easy to broken under impact,broken glass will have sharp corners and cause injury,especially thin glass panels.Through all kinds of strengthening process,glass become stronger and avoid possible injury.Methods to increase glass strength include [thermally tempered glass](#) and chemically tempered glass.Then what's the difference between thermally tempered glass and chemically tempered glass?

Thermally tempered glass:The principle is to heat the glass to a suitable temperature(670-720℃) and then cool it quickly, causing the glass surface to shrink sharply and form compressive stress. However, the glass middle area cools slower and formed tensile stress , which makes the glass obtain higher strength. Generally speaking, the higher the cooling strength, the greater glass strength.



Chemically strengthened glass:The process is sink glass into 400℃ alkali salt solution ,then glass surface will have chemically exchange between small radius ions in glass and larger radius ions in the solution.

For example, lithium ions in the glass are exchanged with potassium or sodium ions in the solution, and sodium ions in the glass are exchanged with potassium ions in the solution. The difference in the volume of alkali ions is used to form intercalation stress on glass surface. The amount of large ions squeezed into the surface of the glass is proportional to the surface pressure, so the amount and depth of ion exchange decide the final strengthening performance.



Difference between Thermally&chemical strengthened glass

Difference	Thermally tempered glass	Chemically strengthened glass
Processing Temperature	600-700°C	400-450°C
Principle	Thermally,fast cooling process to form strength	Chemically,Ion exchange
Thickness	3-25mm	0.15-50mm,especially for thickness<5mm
Broken fragment shape	Small particles	Large pieces
Surface strength	>90Mpa	>400Mpa
Flatness	<3‰	<1‰
Further Processing	No	Yes
Spontaneous explosion	Yes	No

Pros and Cons of Thermally tempered glass:

Pro 1: Low costs, large production capability.Glass tempering can be finished within 10 minutes.

Pro 2: High mechanical strength, thermal resistance (safe working temperature can reach 287.78°C).



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Pro 3: Safety, glass will break into small fragments when broken, which can reduce harm to the human body.

Cons: Glass self explosion, tempered glass can explode during tempering processing, storage, transportation, installation, and even after installation in uncertain time.



The [spontaneous explosion](#) caused by visible defects in the glass, such as stones, sand particles, bubbles, inclusions, notches, scratches, edge bursts, etc. and unreasonable installation; Or nickel sulfide (NIS) impurities and heterogeneous particles in the glass cause the tempered glass to explode.

Tempered glass cannot be [further processed](#)-cut, polishing, so glass must be cut and polished before tempering process.

Pros and Cons of Chemically strengthened glass:

Pro 1. High strength, uniform stress, good stability, no self-explosion phenomenon, can be further cut and processed, no deform, no optical distortion, and is suitable for the reinforcement of glass products with special shapes and thin glass panel.

Pro 2. The strength is 5 to 10 times that of float glass, the bending strength is 3 to 5 times higher, as well as 5-10 times higher impact strength. It improves the strength and safety at the same time. Chemical strengthened glass has higher strength than thermally tempered glass based on same thickness.





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Pro 3. The resistance to rapid cold and rapid heat is 2-3 times the normal glass, can withstand temperature changes of more than 150LC, No fragile, and no spontaneous breakage.

Pro 4. No deformation, and can chemically strengthening any shape glass, Such as arc shape, cylindrical shape, bottle shape, box shape, flat shape etc.

Pro 5. Suitable for ultra-thin products below 3mm,no optical deformation,no bending.

Cons: High production costs,low production efficiency.

Applications:

Thermally tempered glass:Widely used in places with high mechanical strength and safety requirements, such as: curtain walls, facade windows, indoor partitions, furniture, household appliances, partitions near heat sources and locations subject to severe cold and heat shocks, etc.The tempered glass will always been further processed to be laminated ,[double glass units](#) to get better thermal,safety and acoustic performance.



Chemically strengthened glass:Usually used in electronic display products, such as monitors, televisions, tablets, mobile phones, etc. as screen protection panels.





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Meanwhile chemically strengthened glass are used for architectural glass which cannot be toughened by glass tempering furnace,such as hot [bending glass](#),irregular shape glass etc.



Morn is your turnkey thermally tempered glass and chemically strengthened glass in China,welcome contact us for your next great project.

Contact us:

Qingdao Morn Building Materials Co.,Ltd

China HQ: Room A304,Shengxifu Road,NO.209 Weihai Road,Shibei
District,Qingdao,China,266024

Sales Email: marketing@cnmorn.com

Technical support: han@cnmorn.com **Mobile/Wechat:** 0086-17705464660

Website:<https://www.cnmorn.com/> <https://www.mornglass.com/>