THERMAL TEMPERING.

HIGH RESISTANCE TO IMPACTS, BENDING & SCRATCHES.

BERLINER GLAS
Technical Glass
BERLINER GLAS GROUP

THERMAL TEMPERING.

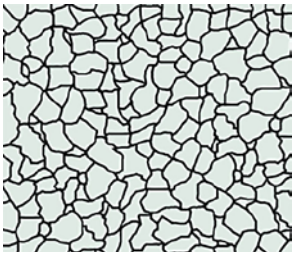
The term "thermal tempering" refers to the process of thermally strengthening tempered safety glass (TSG) and semi-tempered glass (STG). Using a defined heating and cooling process, tension is created artificially in the glass that results in glass that provides high resistance to impacts, bending and scratches as well as changes in temperature. Tempered safety glass (TSG) simply crumbles when broken.

Tempered Safety Glass (TSG)

As opposed to laminated safety glass (LSG), tempered safety glass (TSG) consists only of individual, specially thermally treated panels. The glass is heated to ca. 640 °C and then cooled suddenly. The center of the glass pulls back from the glass surface, which is also being compressed. This process gives TSG an increased resistance to shocks and impacts. This glass does not react to large changes in temperature and breaks into small, dull pieces when exposed to extreme pressure. This greatly reduces the risk of injury.

We offer thermally tempered glass in the form of tempered safety glass (TSG) with the following properties:

- high resistance to impacts
- high resistance to bending
- high resistance to scratches
- high resistance to temperature changes
- breaks into small pieces according to count field design



Fracture pattern (TSG): Crumbling

Semi-Tempered Glass (STG)

Semi-tempered glass (STG) is exposed to a thermal tempering process just like TSG. However, the cooling process is slower, which results in less of a tension difference in the glass between the center and the surface. The resistance to bending lies somewhere between the resistance of standard float glass and that of tempered safety glass. If broken, the resulting pieces resemble those of normal, non-hardened float glass.

Technical Specifications

Glass types	float glass, etched glass, anti-reflective coated glass, patterned glass, colored glass
Glass thickness	TSG: 4–12 mm STG: 3–12 mm
Min. panel width	100 mm
Min. panel length	300 mm
Max. size	1,600 x 2,800 mm

Quality Assurance

We electronically control and monitor our processes in order to satisfy the process parameters, temperature and hardening duration and document the results. Regular tests and analyses ensure that the tempering process runs smoothly. Our tempered safety glass (TSG) and semi-tempered glass (STG) is based on the recommendations of DIN EN 12150-1 and DIN EN 1863-1.

Note

All thermally tempered glass should have processed edges. There should be no processing work (milling) following the thermal tempering process. Thermally tempered glass can be printed or coated after it is done.
We recommend chemical strengthening for glass with a glass thickness of <3 mm.

Overview of the properties of tempered glass

Properties	Float glass (untreated float glass)	TSG (thermally tempered glass)	STG (semi-tempered glass)
Stone impact resistance in km/h	no change	no change	no change
Resistance to bending	ca. 45 N/mm²	ca. 120 N/mm²	ca. 70 N/mm²
Resistance to change in temperature	ca. 40 K	ca. 150 K	ca. 100 K
Cutting ability	Yes	No	No
Fracture pattern	cracking pattern	crumb structure	cracking pattern

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