

## Glass Technical Document

### Heat Soaking How it Works

Tristar Glass Inc. supports the industry standard concerning the use of fully tempered glass. In other words, fully tempered glass should only be used when and where necessary. These areas are defined as areas where safety glazing characteristics are required by code and for high wind load areas where both annealed and/or heat strengthened glass will not meet the appropriate project design wind loads. It is the responsibility of others to ascertain that they are in compliance with any and all local safety glazing codes.

Tristar Glass Inc. does indeed offer the service of the heat soaking of fully tempered glass. Fully tempered glass is defined as glass having a surface compression of 10,000psi or greater. Heat Soaking is an off-line process. While there is no formal American standard that addresses heat soaking, the methodology utilized by Tristar Glass Inc. is that found in the European BS EN 14179-1:2016 Standard.

In the European methodology the glass is loaded into a pin rack, in a vertical position, and placed into the heat-soak oven. The glass is then slowly brought up to a temperature of approximately 482 degrees F and held at that temperature for approximately 2 hours. The glass is then slowly cooled and removed from the heat-soak oven. The heat soak process, lasts from 7-1/2 to 8 hours in its entirety.

It is our understanding that the concern with regard to fully tempered glass products is the phenomenon known as spontaneous breakage.

Foreign inclusions in the finished glass product, such as un-dissolved limestone particles, fire brick particles from the furnace walls or roof, or nickel sulfide stones, (crystals), may cause breakage under certain rare circumstances. These foreign or un-dissolved objects are always present in the glass batch, but they are generally so small as not to be visible.

For breakage to be caused by nickel sulfide stones, the stone must be in the center third of the glass thickness, it must be of the rare alpha crystalline structure and it must be in glass that has been heated above 700 degrees Fahrenheit, then rapidly cooled.

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There is no known method to inspect for these virtually invisible inclusions or to eliminate them from the glass batch. The incidence of glass breakage is extremely small compared to the total volume of the fully tempered glass produced. It is generally far smaller than breakage caused by vandalism or windborne objects, such as roof gravel.

The practice of the heat soaking of fully tempered glass to reduce the potential for nickel sulfide stone spontaneous breakage has been and is still offered by only a few glass fabricators. Not all technologists agree that heat soaking will significantly reduce the potential for glass breakage from nickel sulfide stone inclusions. Additionally, the process adds a significant cost to the fully tempered glass product.

If breakage in fully tempered glass from nickel sulfide stone inclusions is indeed a concern to the owner, architect, contractor or glazier, the use of heat-strengthened glass might be considered appropriate in locations other than those required by code to be glazed with a safety glazing product.

It is important to note that only a few glass fabricators perform heat soaking. It is even more important to note that none of these glass fabricators provides a warranty for glass breakage due to nickel sulfide stones.

In summary, Tristar Glass Inc. offers the service of heat soaking. In addition Tristar Glass Inc. does not warrant glass breakage for any cause. However, the change in glass configuration relative to that of heat-strengthened / tempered or heat-strengthened / heat-strengthened or laminated will serve to minimize any possible occurrence of spontaneous breakage.

Sincerely,

Tristar Glass Inc.

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