

Heat Strengthened vs. Fully Tempered

There are essentially two (2) types of heat-treated glass products, i.e. heat-strengthened and fully tempered. Found below are the features and benefits of each of these processes.

Heat-Strengthened

- Possesses approximately twice the mechanical and thermal strength of annealed glass of the same size and thickness.
- Can withstand a temperature differential of approximately 250 degree F. Makes it ideal for use in areas where thermal stress is of a concern such as that of spandrel areas.
- With the exception of strength and breakage characteristics, heat-strengthened glass retains the normal properties of annealed glass, including chemical resistance, hardness, expansion and deflection.
- Possesses a surface compressive stress level of from 3,500psi to that of 7,500psi for glass thicknesses of 1/4"[6mm] or less. Tristar Glass Products targets a compressive stress level of approximately 5,500psi for its heat-strengthened glass products.
- Heat-strengthened glass is much less prone to spontaneous breakage in comparison to that of fully tempered glass products.
- Due to its lower compressive stress levels, heat-strengthened glass generally exhibits less noticeable visual warp, bow and distortion in comparison to fully tempered glass products.
- Heat-Strengthened glass normally has a breakage pattern of large pieces, similar to the breakage pattern of annealed glass. The large pieces are generally held in place by the glazing system so heat-strengthened glass is less likely to vacate the opening in comparison to fully tempered glass products.
- Heat-Strengthened glass is NOT a safety glazing material.
- Conforms to ASTM C 1036, Standard Specification for Flat Glass and ASTM C 1048, Standard Specification for Heat-Treated Flat Glass: Kind H.S., Kind F.T.



Fully Tempered

- Possesses approximately four times the mechanical and thermal strength of annealed glass of the same size and thickness.
- Can withstand a temperature differential of approximately 400 degrees F. Makes it ideal for use in areas where safety glazing characteristics are required by code or in high wind loads areas that cannot be met through the use of annealed and/or heat-strengthened glass products.
- With the exception of strength and breakage characteristics, fully tempered glass retains the normal properties of annealed glass, including chemical resistance, hardness, expansion and deflection.
- Possesses a surface compressive stress level of a minimum of 10,000 psi for glass thicknesses of 1/4"[6mm] or less. Tristar Glass Products targets a compressive stress level of approximately 12,000 to 15,000psi for its fully tempered glass products.
- Fully tempered glass is much more prone to spontaneous breakage in comparison to that of annealed and heat-strengthened glass products.
- Fully tempered glass is NOT recommended for use in spandrel area type applications.
- Due to its higher compressive stress levels, fully tempered glass generally exhibits more noticeable visual warp, bow and distortion in comparison to annealed and heat-strengthened glass products.
- Fully tempered glass normally has a breakage pattern of very small pieces and is less likely to cause severe injuries. The small pieces generally lose their rigidity upon failure and are therefore more likely to vacate the opening in comparison to annealed and heat-strengthened glass products. Conforms to ASTM C 1036, Standard Specification for Flat Glass and ASTM C 1048, Standard Specification for Heat-Treated Flat Glass: Kind H.S., Kind F.T.
- Fully tempered glass IS a safety glazing material.
- Conforms to ASTM C 1036, Standard Specification for Flat Glass; ASTM C 1048, Standard Specification for Heat-Treated Flat Glass: Kind H.S., Kind F.T.; Consumer Product Safety Commission 16 CFR 1201; ANSI Z97.1 American National Standard for Safety Glazing Materials used in Buildings Safety Performance Specifications and Methods of Test.

Lastly, it should be noted that TristarGlass Products supports the industry standards 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 or high wind load areas where both annealed and/or heat-strengthened glass will not meet the appropriate project design wind loads.

