

## **Glass Annealing and Thermal Tempering**

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Annealing of glass is defined as the process of preventing or removing objectionable stresses by controlled cooling from a suitable temperature. Annealing can be regarded as a reheating following forming with the objective of restoring a uniform temperature throughout the glassware. However, melting has attempted to achieve chemical homogeneity and to deliver glass to forming at a uniform temperature. Annealing has the functions of correcting these temperature heterogeneities by dissipating the developed permanent strains, avoiding deformation and other defects; then cooling to room temperature without fracture or introduction of new destructive strains. Therefore annealing is the releasing of stresses and strains by reducing the unwanted stresses and controlling of distribution stresses.

Thermal tempering can be considered as reverse annealing or disannealing which can also be defined as the imposition of permanent stresses. Instead of striving for temperature homogeneity, rapid chilling is applied from temperatures as close to deformation as feasible. Such a process results in a temperature gradient from chilled surface to interior. If the operation is properly performed, a favorable stress distribution can be obtained. The main target to be reached by tempering of glass is to strengthen the surface and create a higher level of compression, but also to keep the compression and tension in equilibrium which leads a uniform distribution.

**Key words:** Annealing, tempering, stress, strain, homogeneity.