

Annealing

Injection molding plastic parts invariably produces molded in stresses. These stresses arise from a number of sources. Differential flow patterns in the mold, sharp wall transitions, different wall thicknesses, and machining all contribute to nonuniform distribution of inherent stresses.

Although annealing reduces stresses, it should not be considered a cure-all for a number of reasons

- Annealing glass-filled parts may not thoroughly relieve internal stress, because they are composites.
- Studies show that post-molded heat histories may increase notch sensitivity and reduce chemical compatibility with certain substances. Therefore, the time at temperature should be the minimum needed to achieve acceptable part performance.
- The extended periods of time needed for annealing may prevent it from being used economically in actual production.

Review and examine molding procedures and part design for possible problems before choosing annealing as a solution

Always anneal parts in an air circulating oven and cool them slowly to prevent thermal “shock,” as cooling rates may reintroduce stresses into the part causing warping and cracking. To avoid overly rapid cooling rates, cool the parts by turning the oven off until the parts return to ambient temperatures.

Each resin and resin grade SABIC Innovative Plastics produces is manufactured to provide certain physical properties and characteristics. Consequently each resin family has a different annealing procedure. The following are guidelines for annealing various resins.

Cyclocac* resins	Anneal Cyclocac materials at the specific resin grade's heat deflection temperature at 264 psi. Hold annealed parts at temperature for one to two hours.
Cycloy* resins	Anneal Cycloy materials at the specific resin grade's heat deflection temperature at 264 psi. Hold annealed parts at temperature for one to two hours.
Lexan* resins	Anneal Lexan at 250°F for as short as time as possible to achieve acceptable part performance (30 minutes at temperature 250°F per 1/8 inch thickness). Determine this time by experimenting with actual end-use testing.
Noryl* resins	Anneal Noryl molded parts at 30°F less than the resin's heat deflection temperature at 264 psi. Use an annealing time of one hour per 1/8 inch thickness
Ultem* resins	Anneal Ultem resin parts at a 400°F over a period of two hours. Thicker parts may require longer periods of time.
Valox* resins	Anneal Valox resin parts at 30°F less than the heat deflection temperature at 264 psi for the specific grade. An annealing time of 30 minutes per 0.125 inch thickness is suggested. Anneal unfilled grades at the 264 psi heat deflection temperature.
Xenoy* resins	Anneal Xenoy resins 30°F below the heat deflection temperature at 264 psi.

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