

Part Design & Assembly Annealing Procedure

ANNEALING PARTS MOLDED OF PLEXIGLAS® ACRYLIC RESIN

Annealing is recommended to insure optimum quality and maximum useful service life from parts molded of Plexiglas acrylic resin. The primary benefits of annealing Plexiglas parts are improved resistance to external stresses (mechanical or chemical) and greater dimensional stability at elevated service temperatures.

Annealing is the process of heating a molded part for a period of time at a temperature near, but below, its softening point. After heating the part, slow, uniform cooling will cause stress relaxation without distortion of shape. The ultimate goal of annealing is to redistribute and reduce the stresses in the part generated by the injection molding process. Annealing does not *completely eliminate* molded-in stresses in a well-molded part, and can only partly relieve the internal stresses in a poorly-molded part.

SELECTING THE BEST ANNEALING CYCLES FOR YOUR PLEXIGLAS MOLDED PARTS

(This procedure is only intended to establish a suitable temperature and time period for annealing your parts. To achieve the maximum benefits from annealing, also follow the suggestions listed below the table.)

1. Place several carefully measured, as-molded parts in the annealing oven at the higher temperature from the table below for the specific grade from which the parts were molded.
2. Heat-treat them for the length of time indicated for the maximum applicable part thickness.
3. Remove the parts from the oven and let them stand for several hours at room temperature before remeasuring their dimensions.

Plexiglas® acrylic plastic is a combustible thermoplastic. Observe fire precautions appropriate for comparable forms of wood and paper. For building uses, check code approvals. Impact resistance is a factor of thickness. Avoid exposure to heat or aromatic solvents. Clean with soap and water. Avoid abrasives.

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4. If the dimensional change following this heat treatment proves no greater than 1%, or the maximum permissible change for your specific application, the parts may be properly annealed with these conditions. In certain cases, even additional heating time may be required to further relieve internal stresses.
5. If the dimensional change exceeds 1% (or maximum permissible), repeat the test at the lower temperature and time indicated in the table. If unacceptable dimensional changes continue to occur, this is positive evidence the part is poorly molded and requires improvement of molding conditions.

Maximum Thickness (inches)	Plexiglas V825, V826		Plexiglas V052, V045, V044, V920, DR, MI7, HFI10, HFI7, SG10, SG7		Plexiglas VM, VS, VH		Maximum Cooling Rate (°C/Hour)
	95°C	90°C	85°C	80°C	75°C	70°C	
0.060 to 0.150	2.5	7.5	2.5	7.5	1.5	7.5	40
0.151 to 0.375	3	8	3	8	2	8	20
0.376 to 0.750	4	9	4	9	3	9	10
0.751 to 1.125	5	10	5	10	4	10	8
1.126 to 1.500	8	13	8	13	7	13	5

SUGGESTIONS FOR MAXIMIZING ANNEALING EFFECTIVENESS

1. Annealing should be performed in forced circulating air ovens with the parts supported so they are not under stress. Air should circulate freely around each part.
2. Slow-cooling will produce the best annealing after heating. Strictly observe the maximum recommended cooling rates from the table. Annealed parts should not be removed from the oven until the temperature reaches 50°C.

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3. If practical, parts should be annealed after all fabrication is complete, including cementing, machining, polishing, and decorating. If crazing occurs when unannealed parts are cemented or decorated, this may be remedied by annealing the parts both before and after these operations.

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