

ANNEALING OF ULTEM (PEI)

Why Anneal Plastics?

If, during the machining process, significant material is removed, annealing is recommended to relieve machined-in-stress and minimize possibility of premature part failure.

All extruded stock shape plastics are compressed through a profile die when extruded. The compression that occurs in the material is not relieved because the plastic “sets up” as soon as it comes out of the die and it remains in this compressed or highly stressed state. This high state stress will cause four problems if not addressed:

1. Materials will tend to warp and distort
2. Physical properties will be different than published data (usually lower)
3. Material may crack
4. Finished part dimension may change.

In order to eliminate these problems extruded products are annealed. Annealing is a stress relief process, which occurs when the material is exposed to heat (air or fluid) above its glass transition point, which allows the material to “decompress” back to a relaxed state. Annealing is important if you want a quality, finished part out of your stock shape.

ANNEALING/STRESS RELIEVING PROCEDURES FOR ULTEM

1. PLACE PARTS IN AIR CIRCULATING OVEN SUCH THAT AIR CAN CIRCULATE AROUND THEM.
2. HEAT OVEN TO 300°F AT A MAXIMUM HEATING RATE OF 20°F PER HOUR.
3. HOLD OVEN TEMPERATURE AT 300°F FOR 60 MINUTES PLUS 30 MINUTES FOR EVERY 1/8” OF CROSS-SECTION.
4. HEAT OVEN TO 400°F AT A MAXIMUM HEATING RATE OF 20°F PER HOUR.
5. HOLD OVEN TEMPERATURE AT 400°F FOR 2 HOURS PLUS 30 MINUTES FOR EVERY 1/8” OF CROSS-SECTION.
6. COOL OVEN TO 150°F OVER 25 HOURS WITH A MAXIMUM COOLING RATE OF 10°F PER HOUR.
7. TURN OFF OVEN AND ALLOW TO COOL TO ROOM TEMPERATURE BEFORE REMOVING PARTS.

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