INTRODUCTION

Plexiglas® HT121 is a special acrylic copolymer that provides exceptional heat resistance in high temperature environments. It has excellent weatherability and optical properties that allow it to excel in high temperature applications that require outdoor stability, high quality surface appearance and/or precision optics. This excellent combination of properties makes Plexiglas® HT121 resin a perfect polymer for long-path length (LPL) applications in automotive lenses, and accent signature lighting.

DRYING CONDITIONS

All Plexiglas® acrylic polymers are somewhat hygroscopic. Proper drying time, temperature, and storage will minimize moisture related defects. While moisture in the resin does not affect the performance of the molded part, it can cause aesthetic defects such as splay or splash marks during processing. Because moisture will readily vaporize at processing temperatures, the resin must be dried prior to use.

Additional care is required when drying Plexiglas® HT121 resin because it is slightly more hygroscopic than traditional grades. The recommended moisture content depends on application process temperature. For example, molding at a relatively high temperature, around 500°F (260°C), requires the resin moisture content to be near 0.02% to avoid aesthetic defects. A moisture level of 0.05% is satisfactory when molding at lower temperatures, around 450°F (232°C).

To achieve the best possible drying, a dehumidified or desiccant drying system is recommended. Dew points of -20°F to -40°F (-29°C to -40°C) are recommended in these systems. The system should have good air distribution with sufficient velocity. A common rule of thumb is to have an air flow approaching 1 cfm, per pound of resin (0.062 m^3/min/kg), in a hopper that is nearly full.

Plexiglas® HT121 resin should be dried for 2–4 hours at 195°F (90°C) using the drying conditions listed above. Typically, over-drying is not an issue for Plexiglas® HT121 resin. However, the time and temperature for drying should be kept at a minimum when the intended use of Plexiglas® HT121 resin is for long-path length, or thick lens applications. Slight discoloration, caused by the drying process, can be magnified in these optically sensitive applications.

After the Plexiglas® resin is dried, it must be kept in a dry environment to prevent moisture reabsorption. If exposed to ambient conditions for as little as 30 minutes, Plexiglas® HT121 resin can reabsorb enough moisture to generate aesthetic defects in molded parts.

INJECTION MOLDING EQUIPMENT

To minimize cross contamination, the injection molder should be dedicated to processing Plexiglas® resin grades.

Reciprocating screw injection molding machines equipped with a general-purpose screw design are adequate for processing Plexiglas® HT121 resin. A floating check ring, rather than a ball check, is recommended. Nozzles should be of the tapered design, and as short as possible.

Shot capacity of the barrel should be 20–80% for standard applications. For optically critical, long-path length applications, or applications with long cycle times, the shot capacity should be 50–80%.

The barrel and screw should be chrome plated. Nitriding is not recommended, since it can cause polymer discoloration.

MOLD REQUIREMENTS

Molds should have adequate coring to permit good water circulation, and efficient cooling. Mold temperatures should be adjustable from 150°F to 200°F (66°C to 93°C) to achieve the best balance of part appearance and cycle time. The surface of the mold cavity should be a stainless steel or high chrome tool steel with a minimum Rockwell C scale hardness value of 35. The mold surface should be highly polished to SPI-SPE mold finish #1 or #2 to achieve molded parts with maximum gloss. Most gating techniques are suitable including sprue, edge, tab, and tunnel.

Plexiglas® HT121 resin is an amorphous material, so part shrinkage in the mold is minimal. Mold shrinkage can range from 3 to 8 mils per inch (0.003 to 0.008 mm/mm), depending on the molding conditions used.

Adequate venting is required to eliminate trapped gases in the mold, and to prevent diesel burning. Vent depths should be 0.002 inch (0.05 mm) for sunburst or a continuous venting system.

INJECTION MOLDING PARAMETERS

Plexiglas® HT121 resin has a large processing window. The following table lists recommended start-up parameters. Depending on the mold design, the specific part, and machine capabilities, adjustments may be necessary to achieve optimum processing conditions.

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