

ALTUGLAS® LUCTOR™
PLEXIGLAS®

FOR MEDICAL RESINS

Injection Molding Guide



ALTUGLAS
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ARKEMA GROUP

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Introduction

Plexiglas® Medical Resins offer a history of over 30 years of outstanding performance and durability and our new Altuglas® Luctor™ resin adds to this legacy. Designed specifically for disposable medical devices, Altuglas® Luctor™ provides excellent chemical resistance to ethyl and isopropyl alcohols. Just like our Plexiglas® Medical Resins, Altuglas® Luctor™ has excellent scratch resistance, outstanding bonding characteristics and good optical properties. Additionally, these resins offer ease of processing and exceptional flow properties, allowing for their use in a wide range of molding processes.

Drying Conditions

Altuglas® Luctor™ and Plexiglas® Medical Resins are somewhat hygroscopic which can affect the appearance or performance of the device if molded with excessive moisture content. Plexiglas® Medical Resins will exhibit aesthetic defects such as streaks, splay, or splash marks. Altuglas® Luctor™ will exhibit the same aesthetic defects as well as a reduction in physical properties. Because moisture (water) is a volatile substance and will more readily vaporize at higher processing temperatures, the resins need to be dried prior to use. The degree of recommended % moisture content will depend on the user's processing temperature. For example, to mold at temperatures around 500°F (260°C), the material will have to be drier in order to avoid aesthetic defects than if molded at 450°F (232°C). Moisture levels of 0.05%

are satisfactory for low barrel temperatures. For high barrel temperatures, moisture levels down to 0.02% or less will be needed.

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. Dew points above 0°F (-18°C) are unsatisfactory. Recommended drying temperatures differ for Altuglas® Luctor™ and Plexiglas® Medical Resins. Plexiglas® Medical Resins should be dried for 4 hours at 180°F (82°C) within the dew point range listed above and Altuglas® Luctor™ should be dried under the same conditions but at a lower temperature, 150°F (65°C). Proper drying temperatures and drying time will ensure zero moisture related defects.

Injection Molding Equipment

Reciprocating screw injection molding machines equipped with a general-purpose screw design are adequate for processing Altuglas® Luctor™ and Plexiglas® Medical Resins. This screw design, typically used for thermoplastic materials, should have 50% of its length as the feed zone, 25% as the compression zone, and 25% as the metering zone. A screw L/D (length to diameter) ratio between 18:1 and 24:1 and a screw compression ratio between 2:1 and 3:1 are recommended. A floating check ring, rather than a ball check, is also recommended. Nozzles should be of the free-flow design and as short as possible.

Mold Requirements

Molds should have adequate coring to permit good water circulation from mold circulators. Water temperatures can be adjusted from 100°F to 150°F (38°C to 66°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 surfaces 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.

Since Altuglas® Luctor™ and Plexiglas® Medical Resins are amorphous materials, mold shrinkage will vary depending on the molding conditions used. Mold shrinkage variation can range from 3 to 8 mils per inch (.003 to .008 mm/mm). Adequate venting is required to eliminate trapped gases in the mold and to prevent diesel burning. Whether sunburst vents or a continuous venting system is employed during production, we recommend vent depths of 0.002 inch (0.05 mm) are used.

Injection Molding Parameters

Altuglas® Luctor™ and Plexiglas® Medical Resins have a large processing window. The following table lists recommended start up conditions although adjustments may be necessary to achieve an optimum process depending on the specific part and mold design and machine capabilities. To ensure less molded-in stress in the final parts, the resins should be processed at the upper end of their processing window.



Typical Start-Up Injection Molding Conditions

For Single Stage, Non-Vented Barrel Machines

Grade	Cylinder Temperature				Other Parameters			
	Rear Zone (°F)	Center Zone (°F)	Front Zone (°F)	Nozzle (°F)	Injection Speed	Screw Speed (RPM)	Back Pressure (PSI)	Mold Temp (°F)
Luctor	430	430	440	430	Medium	50-100	100	100
SG10	430	440	450	440	Medium	50-100	100	160
SG7	420	430	440	430	Medium	50-100	100	150
VS-UVT	360	370	380	370	Medium	50-100	100	130

Purge Procedures

1. Thoroughly clean the feed hopper after removing all of the resin.
2. Retract the injection unit carriage from the mold, leaving ample room for the purge to exit the nozzle.
3. Purge the resin from the barrel and thoroughly clean the nozzle, nozzle tip and sprue bushing.
4. Set injection barrel temperature profile to at least 500°F but do not change the profile if it is >500°F. This temperature will ensure that the resident resin melts.
5. Load 5-10 times the barrel capacity of Plexiglas® V826 into the feed hopper. Material need not be dry.
6. Set the back pressure to 0 and the shot size to >50% of the maximum allowable setting. Alternate the injection speed between high and low and purge until polymer exiting the nozzle is free of contaminant.
Note: For additional cleaning, move the screw completely forward and use the maximum safe screw speed and back pressure while purging. Alternatively, employ a purge compound such as Pekutherm® N at a 50/50 ratio with Plexiglas® V826. This compound is a high molecular weight PMMA resin. Load 5-10 times the barrel capacity of this mixture into the feed hopper. Repeat step six until polymer exiting the nozzle is free of contaminant. Then load the feed hopper with 2-3 times the barrel capacity with 100% Plexiglas® V826. Material need not be dry.
7. Set the barrel zone temperatures to the recommended temperature profile for Plexiglas® or Luctor™. With the back pressure set at 0 and the shot size >50% of the maximum allowable setting, purge the Plexiglas® V826 once every 15 minutes until the barrel temperature profile stabilizes.
8. Remove Plexiglas® V826 from the feed hopper and replace with Plexiglas® or Luctor™ medical resin and begin normal molding.

SHUTDOWN for Long Delays (>5 minutes)

For long delays, the carriage should be retracted, the feed slide closed, the screw and barrel emptied of material and the barrel heaters should be lowered to 300°F (149°C). For overnight shutdowns, the barrel should be emptied and the heaters turned off. A voltage reduction switch for the heaters is suggested as a safety procedure.



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It is the sole responsibility of the manufacturer of final end-use (and finished) products to conduct all necessary tests (including biocompatibility tests) and inspections and to evaluate the final product under actual end-use requirements.

Plexiglas® and Altuglas® Luctor™ are combustible acrylic thermoplastics. 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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See MSDS for Health & Safety Considerations.

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