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Ryton® PPS XE Injection Molding

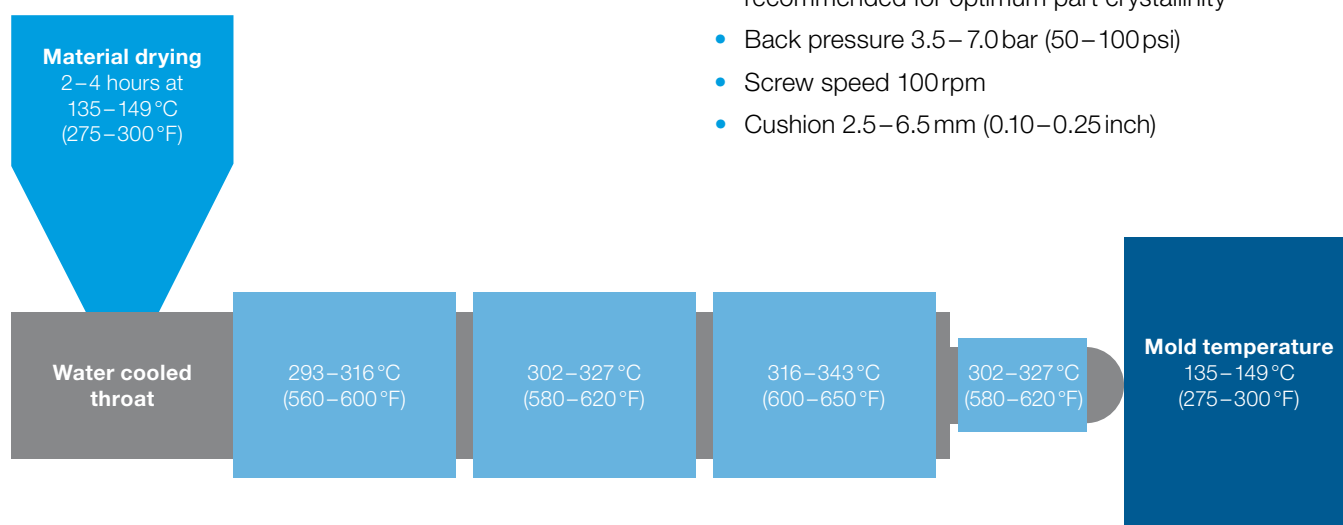
Ryton® PPS XE Series alloys are easily processed on conventional reciprocating screw injection molding machines using standard molding practices. For reinforced grades, abrasion resistant materials are recommended to reduce wear incurred by the glass and mineral fillers. Maximum possible injection pressure is recommended to achieve optimum part packing. Heated molds are recommended to achieve sufficient crystallinity to ensure optimum high-temperature dimensional stability of the part. Listed below are general suggestions for injection molding XE Series alloys. Please contact our technical service staff if you have additional questions.

Melt or Stock Temperature

The processing temperature range for XE Alloys is 304–343 °C (580–650 °F). Typically, it is suggested that the melt temperature, as measured by pyrometer, be kept on the low to medium side, typically in the range of 310–321 °C (590–610 °F).

Mold Temperature

For a crystalline part, the mold temperature needs to be 135–149 °C (275–300 °F), and is best controlled by using circulated hot oil.



Equipment Requirements

- Abrasion resistant barrel (Xaloy 802)
- 16:1 to 20:1 L/D screw with 2.5:1 compression ratio; hardened flights (Stellite or Colmonoy 6)
- Abrasion resistant ring type check valve
- Reverse taper (Nylon Tip) or automatic positive shut-off nozzle
- Mold steel Rc 60 or higher (A2 or D2)
- Shot size 25–75 %
- Clamp tonnage 2.5–4.0 tons/in²

Material Drying

- Dry at 80 °C to 85 °C (175 °F to 185 °F) for 4 to 6 hours prior to processing.
- Hopper driers and/or desiccant driers are suggested with –40 °C (–40 °F) dew point recommended.
- Moisture content < 0.1 %

Machine Settings

- See barrel temperature profile above
- Mold temperature 135–149 °C (275–300 °F) recommended for optimum part crystallinity
- Back pressure 3.5–7.0 bar (50–100 psi)
- Screw speed 100 rpm
- Cushion 2.5–6.5 mm (0.10–0.25 inch)

- **Injection speed:** A medium to fast fill speed should work well, depending on wall thickness. Typical fill time is in the range of 0.5 to 2.0 seconds for small to medium sized parts with larger parts possibly requiring longer fill times. If burning or flash occurs, check vents or slow down injection speed.
- **Injection boost pressure:** Set as high as required to achieve the injection speed set. Velocity control during injection part fill should be utilized with a transfer to pressure control for part pack and hold. This requires the Boost pressure to be set higher than the peak pressure required to fill, usually by several hundred psi. Be sure not to pressure limit the process.
- **Injection pack/hold pressure:** Typically set at 50 to 85 % of peak injection pressure. Be sure to set high enough to achieve maximum cavity pressure in the part.
- **First stage timer:** Switching on position or cavity pressure is recommended; typically 95 to 99 % of cavity fill. The timer should be set slightly longer than the fill time.
- **Second stage timer:** Longer Pack and Hold times are required when processing XE Series alloys. Typically 10 to 20 seconds is required on small to medium sized parts, and 20 to 40 seconds on larger or thicker walled parts. However, this is dependent on gate size, so inspect parts for sinks or porosity and check part weight at various hold times to get the proper setting.
- **Cooling time:** Longer cooling times are also typically required for XE Series alloys. Usually 15 to 30 seconds is adequate for small to medium sized parts, with 30 seconds to a minute and up required for larger or thicker walled parts. Evaluate part sticking, wall distortion, flatness or dimensions for proper cooling time setting. Evaluate additional cooling time or wall draft for part sticking problems.
- **Barrel purge:** A Fractional Melt HDPE (Marlex® HHM 50100) or commercial high temperature purge compound is acceptable.

Off-gas products produced during processing can be irritants to the mucous membranes, therefore adequate ventilation is recommended.

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