Veradel® PESU

Processing Guidelines

Start-Up Procedure

1. Set injection molding barrel zone heaters between 343 °C to 354 °C (650 °F to 670 °F).
2. Purge with Veradel® PESU resin until the extrudate appears clear, clean, and uniform in appearance.
3. Set temperature profile according to the set-up sheet. Melt temperature should not exceed 385 °C (725 °F). Check melt temperature with an independent pyrometer probe, because barrel temperature indicators do not show actual melt temperature.
4. When processing temperature is achieved, machine may start production. Do not allow the machine to sit idle for more than 30 minutes or additional purging will be required.

Shut-Down Procedure

1. Set the barrel heater controllers to 343 °C (650 °F).
2. Empty the barrel of Veradel® PESU resin.
3. Introduce a commercial high-temperature purge material.
4. Purge until extrudate is clean and uniform.
5. Reduce barrel temperatures to 316 °C (600 °F).
6. Use fractional melt PE (MFI <0.7) to purge the commercial purging material.
7. Empty the barrel of purge material and turn off the barrel heaters.
8. Retract screw to shot size position.

Molding Cycle Interruptions

Short Interruptions Less Than 30 Minutes

The machine should be purged periodically at the time intervals shown in Table 1.

Table 1 Purging time intervals for Veradel® PESU

Processing Temperature		Interval Between
[°C]	[°F]	Purges [Minutes]
374 to 385	705 to 725	15
363 to 373	685 to 704	17
357 to 362	675 to 684	20
343 to 357	650 to 674	30

Longer Interruptions More Than 30 Minutes

Reduce barrel temperatures to 343 °C (650 °F) while purging at 10-minute intervals. After final purge, reduce barrel temperature to 277 °C to 282 °C (530 °F to 540 °F). After 6 hours, evaluate the situation. If not ready for start up, follow normal shut-down procedure.

Precautions

Material should not be processed at temperatures higher than those recommended. Please carefully review the processing information guide and the material's Safety Data Sheet (SDS).

Plugged Nozzle

The nozzle can become plugged due to obstructions caused by charred, degraded polymer or other foreign objects, or because the material is too cold and no longer molten. It is important to distinguish between these conditions.

A nozzle frozen due to low temperature may be cleared by moving the nozzle away from the cold mold bushing, and waiting about 4 minutes for it to regain temperature. You may also heat the nozzle up to the recommended temperature if the measured temperature is too low. If nozzle plugging due to cold material is a continual problem, insulating the nozzle may be a solution.

If the plugged nozzle is at or above the recommended temperature and remains plugged, follow the procedure below. Polymer degradation may result from extreme processing temperatures and/or extremely long residence times.

Procedure for Clearing a Plugged Nozzle

1. Use extreme caution.
2. Make sure personnel are not exposed to the nozzle. Don't stand in front of the nozzle or lift the guards.
3. Move the nozzle away from the cold mold bushing and wait about 4 minutes for it to regain temperature. If nozzle is not clear, go to step 4.
4. Retract the screw to its maximum rear position without adding new polymer to decompress pressure in the front area, including nozzle.
5. Check your heaters and thermocouples to see if a malfunction has occurred.
6. Avoid looking in hopper and screw feed zone. Back away hopper and remove resin from screw in feed zone.
7. Do not attempt to increase nozzle and barrel temperatures.
8. Do not attempt to inject (bringing screw forward) or pressurize.
9. Turn off heaters on barrel.
10. Follow plant procedures for injection molding equipment repairs.
11. Clear the area around the machine.
12. Use proper safety equipment: clothing, safety glasses or face shield, and gloves.
13. Remove heater from nozzle.
14. Slowly remove nozzle.
15. Clear blockage from nozzle.
16. If polymer is degraded in barrel, it maybe necessary to remove and clean screw and barrel.

General Molding Information

Screw Design

The typical general-purpose screw will perform satisfactorily with Veradel® PESU resins. A typical screw design for processing these materials has a length to diameter ratio of 18 to 22 : 1 and a compression ratio of 1.8 to 2.3 : 1.

Nozzles

Open nozzles are recommended. The configuration of the bore of the nozzle should closely correspond to the screw tip.

Injection Molding Temperatures

Recommended injection molding melt temperatures should be followed. In general, higher temperatures should not be used because of the risk of thermal degradation. As a fundamental rule, injection molding melt temperatures higher than 393 °C (740 °F) should be avoided.

Mold Temperatures

The mold temperature is an important factor in determining the shrinkage, warpage, adherence to tolerance, quality of the molded part finish, and level of molded-in stress in the part.

The mold temperature for Veradel® PESU resins is usually set in the range of 135 °C to 160 °C (275 °F to 320 °F).

Heat loss can be reduced by inserting insulation between the mold and the platen. High-quality molded parts require a well-designed system of cooling channels and correct mold temperature settings.

Barrel Temperatures

Pellets can be melted under mild conditions. Relatively long residence times in the barrel can be tolerated if the temperature settings on the band heaters increase in the direction from the hopper to the nozzle. If residence times are short, the same temperature can be set on all the barrel heaters.

At least one band heater (rated at 200 W to 300 W) is required for the nozzle, where heat loss to the mold may be severe as a result of radiation and conduction. This heat loss can be reduced by insulating the nozzle. The heater band control system should be monitored. For instance, a timing alarm may prevent screw breakage if a heater fails in one of the barrel sections. The feeding of the pellets can often be improved by maintaining the temperature in the vicinity of the hopper at about 80 °C (175 °F). This can be achieved with a water cooling circuit around the hopper throat.

Residence Time in the Barrel

The length of time the plastic remains in the plasticizing cylinder has a significant effect on the quality of the injection molding. If it is too short, the pellets will not be sufficiently melted. If it is too long, thermal degradation is likely and is indicated by discoloration, dark streaks, and even burned particles in the molded parts. Frequently, the residence time can be reduced by fitting a smaller plasticizing unit. Acceptable residence times will be obtained if the shot size is 30 % to 70 % of the barrel capacity. At the melt temperatures 365 °C to 388 °C (690 °F to 730 °F), Veradel® PESU resins will usually tolerate a residence time of 10 to 15 minutes.

Molding Process

Feed Characteristics

Pellets can be conveyed smoothly along the barrel and homogeneously plasticized at the recommended temperatures by screws of the design shown in the *Radel® PPSU, Veradel® PESU, and Acudel® Modified PPSU Design Guide*.

The temperature in the feed section should not be set too high as the pellets may melt prematurely, resulting in the screw flights becoming choked or the throat being bridged.

Back Pressure

Back pressure is usually employed to maintain a constant plasticizing time, avoid air entrainment, and improve the homogeneity of the melt. While some back pressure is generally beneficial, back pressure that is too high can result in high frictional heating.

Screw Speed

Whenever possible, the screw speed should be set so that the time available for plasticizing during the cycle is fully utilized. In other words, the longer the cycle time, the slower the screw speed. For instance, a screw speed of 60 rpm to 100 rpm often suffices for a 50-mm (2-inch) diameter screw. This is particularly important, when running high melt temperatures to ensure that the melt does not remain stationary for an undesirably long time in the space in front of the screw tip. Low screw speeds also diminish a temperature increase due to friction.

www.solvay.com

SpecialtyPolymers.EMEA@solvay.com | Europe, Middle East and Africa

SpecialtyPolymers.Americas@solvay.com | Americas

SpecialtyPolymers.Asia@solvay.com | Asia Pacific

SOLVAY

asking more from chemistry®