

PROCESSING DATA SHEET

POLYCARBONATE GLASS FILLED GRADES

PRODUCT LIST

SICOKLAR E51 SERIES STANDARD GRADES

MATERIAL DESCRIPTION

SICOKLAR™E51 is a GLASS FIBER FILLED POLICARBONATE resin available with GF of 10%, 20% and 30% designed for injection molding applications. Thanks to its superior properties like impact resistance, heat resistance, dimensional stability, SICOKLAR™E51 series can be easily used in a broad range of markets like electrical and electronics, office equipment.

DRYING

PC resins are hygroscopic; they absorb water from direct immersion and from humid air. The amount of water absorbed normally depends on the exposure time, the air temperature and the relative humidity.

At the temperatures used to mold PC, moisture levels can cause visual flaws and brittleness of the molded part.

Therefore, it is recommended that resin moisture content be limited to 0.03% when processing SICOKLAR™ resins.

DRYING EQUIPMENT AND CONDITIONS

Hopper dryers that incorporate dehumidifying units are recommended for drying PC resin granules. It is recommended 3-4 hours at 120°C as minimum-drying conditions for PC resins dried in dehumidifying dryers. Closed hot-air systems are not recommended for use. If tray dryers are used, the depth of the granules should not exceed 25 mm, and the granules should be heated at 120°C for at least 6 to 8 hours, depending on the granule size.

Because dried granules of PC resin can quickly pick up moisture from the air, it is good practice to use them as soon as possible after drying.

MACHINE SELECTION

The size of the machine to be used is determined by the volume of plastic required to fill the mold cavity. It is

good practice to keep the shot size of the machine between 40 and 90 percent of the total capacity. An optimum shot size is between 50 and 80 percent of the machine capacity.

There are three general guidelines for selection of the screw for an injection molding machine to be used with PC resins:

1. A minimum of 18:1 22:1 length-to diameter ratio.
2. A compression ratio between 2,0:1 and 3,0:1.
3. Use of a slip-ring type non-return valve with clearances of at least 3.2 mm.
4. Standard steel nozzles can be used; its is recommended to use the nozzle as shorter as possible, so to avoid the risks of degradation and black specks generation in long production runs.

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MELT TEMPERATURE

The molding machine should be set up to deliver a melt temperature between 280 to 310°C, with an aim of 290°C. The optimum temperature profile depends on many variables such as the ratio of machine capacity to shot size, screw design, mold and part design, and cycle time. Reverse temperature profiles are used occasionally to compensate for improper screw design, to reduce machine amperage or torque requirements, and to compensate for machines with short L/D ratios.

Keeping a uniform melt temperature within recommended range is essential to ensure part performance and color matching to mating component parts. Melt temperatures in the upper end of the recommended range may be necessary when processing thin wall parts, difficult-to-fill parts, parts with very small gates, and parts with long flow lengths. Excessive melt temperatures may result in thermal degradation and a loss of performance, properties and aesthetics. Lower processing temperatures reduce the risk of thermal degradation and shorten the necessary cooling time. However, excessively low melt temperatures may result in high residual molded-in stress.

MOLD TEMPERATURE

The mold temperature range recommended for PC GF materials is 70 to 90°C. Cooling time is important for part performance and cycle time optimization. Using a mold temperature controller will minimize temperature variations. Higher mold temperatures in the upper recommended range generally provide better surface finish, less molded-in stress because of slower cooling, and easier filling of thin wall parts and parts with long flow lengths. Lower mold temperatures allow the molten polymer to set up faster to reduce the overall cycle time. SICOKLAR™E51 resins with different glass fiber rates have different processing windows. In general, resins having higher glass fiber rates require the use of higher mold and melt temperatures.

PARAMETER VALUE

Barrel Temperatures:

Rear (Hopper) 250-260°C ; Intermediate 270-280°C ; Front 290-300°C ; Nozzle 285-290°C

Mold Temperature: 70-90°C

Pressure:

Back Pressure 3-6 Bar

Injection Pressure Adjust to control part weight & dimensions

Hold/Pack Pressure 60-80 Bar

Cushion 3.0-6.0 mm

Rate: Injection Speed Adjust to control appearance

Plasticizing Conditions:

A moderate screw speed of 40-60 RPM is recommended for SICOKLAR™E51 resins.

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Injection Conditions: the appropriate injection speed for SICOKLAR™E51 resins is determined largely by gate design. PC resins are susceptible to formation of gate blush. For parts gated into a visible surface it may be necessary to run the machine at as slow an injection speed as possible.

During the packing phase, the material in the cavity is shrinking; to compensate for this shrinkage, additional material must be supplied to the cavity until gates freeze-off. A small melt cushion provides a ready source of additional melt to use during packing.

If the screw is allowed to "bottom out," the packing pressure cannot be transferred through the polymer to pack out the cavity. This will result in poor part consistency due to short shots, poor dimensional stability, excessive sink marks or poor aesthetics.

It is generally recommended that a small cushion size be employed to minimize heat history on the polymer, reducing the potential for polymer degradation.

REGRIND

Regrind can be used with SICOKLAR™E51 resins if care is taken to avoid cross contamination and moisture pick-up; like virgin resin, regrind must be dried. Large particle sizes of regrind may require longer drying times. However, parts that were rejected because they were molded with wet resin or degraded parts cannot be regrind and reused.

PURGING

Cleaning accurately the barrel and nozzle equipment is essential; due to high processing temperature of the Polycarbonate resin (over 280°C), residual of the resins processed before can degrade generating black specks and color deviation. GPPS or SAN resin can be easily used.

SHUTDOWN PROCEDURE

to shutdown properly the injection molding machinery is important to avoid problems on the new re-start; **typical problems related to improper shutdown are black specks and brown stripes generation.**

for short-term shutdown (4-6 hours) following procedure is recommended:

- 1- close the hopper feeding
- 2- empty the barrel until no material remains into the machinery
- 3- forward the screw
- 4- setting the barrel temperature at 150°C

for long-term shutdown (over 1 day)

- 1- close the hopper feeding
- 2- purge the barrel with GPPS to clean a remove PC residual
- 3- forward the screw
- 4- turn off heat zones

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