

Eastman TRĒVA™

engineering bioplastic

Injection molding processing and design guide

Eastman Trēva™ engineering bioplastic is a versatile, cellulose-based thermoplastic that delivers sustainability benefits, high-level end-use performance, and design and brand flexibility. Trēva's composition is about half cellulose, sourced from trees derived exclusively from sustainably managed forests. Trēva is BPA, BPS, and phthalate free.

Benefits

- Excellent chemical resistance to skin oil, sunscreen, and household cleaners
- Excellent flow in injection molding thin-wall parts
- Low birefringence for optical quality
- Excellent gloss and colorability

Applications

- Eyeglass frames and wearable electronics
- See-through electronic displays
- Electronics housings, cosmetics cases, and other intricate moldings
- Automotive interior components requiring chemical resistance and high aesthetics

MATERIAL PREPARATION

Storage and handling

Protect Trēva in storage and handling from excessive humidity, moisture, or contamination with other plastics or foreign matter.

Drying

Dry Trēva pellets at 75°–85°C for 2–4 hours. Drying is most effective using desiccant dryers with low dew point (–30° to –40°C). Pellet moisture will not significantly affect physical properties of molded parts. However, drying is helpful to minimize moisture-related surface defects and to ensure good feeding on the screw and stable injection pressure and fill time.

Once material is dried, it is important to prevent reexposure to ambient conditions when material is transferred from the dryer to the injection molding machine.

Regrind

Trēva is targeted for high-aesthetic applications which may not be amenable to the quality and cleanliness challenges of using regrind. If regrind is used, it is the molder's responsibility to ensure its suitability for the application. Regrind must be dried prior to processing, whether it is preblended with virgin pellets or fed separately to the molding machine.

Keep regrind clean and free of contamination from other plastics, including some cellulosic plastics. Trēva is compatible with propionates but is not compatible with acetates and butyrates.

EQUIPMENT SELECTION

Injection molding machine and screw

Trēva can be processed well on general-purpose screws with length/diameter (L/D) ratio of 18:1 to 20:1 and compression ratio greater than 2. Occasional problems with screw recovery time can often be solved by adding 0.03% to 0.05% zinc stearate powder to the material.

Residence time in melt

Select injection molding machine size and/or screw size to keep melt residence time at 3–5 minutes or less. This can be aided by keeping cooling time to a minimum and choosing a machine that uses at least 35% of its maximum shot capacity. Excessive residence time in the melt at higher process temperatures can lead to slight yellowness in the molded part. Residence time can be estimated by the following equation:

$$\text{Residence time} = (\text{maximum shot size/actual shot size}) \times \text{cycle time} \times 1.4$$

Type of mold

Trēva can be processed on a wide range of molds and gate designs, including:

- Hot runner molds with thermal or valve gates
- Cold runner molds with edge, web, or fan gates
- Three-plate molds with tunnel or restricted/pinpoint gates

Gate size/thickness range may be 0.7–1.5 mm depending on thickness and size of the molded part and the required part aesthetics.

PROCESSING SETUP

Molding parts with typical thickness (1.5–3.0 mm) can be done across the full range of suggested molding conditions. However, molding thinner parts (0.7–1 mm) requires melt and mold temperatures at the upper end of the range. Higher temperatures help prevent excessive polymer orientation which can cause warpage or surface blemishes. Higher temperatures also help improve weld line strength.

Avoid excessive pack and hold pressures which can lead to warpage or excessive stress near the gate. Parts should be packed just to the point of eliminating sinks or voids.

SHUTDOWN AND PURGING

For shutdown and restart on Trēva, it is sufficient to run the barrel empty, leave the screw forward, and turn off barrel heat. At restart, purge with Trēva for 3–4 minutes at typical processing temperature.

Trēva processing summary	
Parameter	GC6011, GC6021
Drying time, hr	2–4
Drying temperature, °F (°C)	165–185 (75–85)
Barrel set temperature, °F (°C)	440–460 (225–240)
Target melt temperature, °F (°C)	460–480 (240–250)
Mold temperature, °F (°C)	150–190 (65–88)
Injection speed, in./s (cm/s)	1–2 (3–5)
Injection pressure, psi (MPa)	1000–1500 (7–10)
Pack/hold/cooling time, s	2–4/4–6/5–10
Screw recovery speed, rpm	100
Screw back pressure, psi (MPa)	100–150 (0.7–1.0)
Residence time in melt, min	3–5

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