# Extrusion/Thermoforming Process Guide For Cereplast Compostables®

Cereplast Compostables® resins are renewable, ecologically sound substitutes for petroleum-based plastic product, replacing nearly 100% of the petroleum-based additives used in traditional plastics. Cereplast Compostables® resins use polymer and additives derived from starch and other renewable resources chemistry. These components are carefully blended together in state-of-the-art compounding equipments.

All Cereplast Compostables® resins are certified as biodegradable and compostable in the United States and Europe, meeting BPI (Biodegradable Products Institute www.bpiworld.com) standards for compostability (ASTM6400D99, ASTM6868) and European Bioplastics Standards (EN13432).

## PROCESSING INFORMATION

Cereplast Compostables® can be processed on conventional extruders and thermoforming equipment. The material is stable in the molten state, providing that the drying procedures are followed. It is recommended to start with a clean machine.

| Extrusion Processing Parameters | Fahrenheit | Celsius |
|---|---|---|
| Feed Throat | 290-325 | 145-160 |
| Feed Zone | 310-345 | 155-175 |
| Middle Compression Zone | 325-340 | 160-170 |
| Front Metering Zone | 330-345 | 165-175 |
| Die and Adapter | 330-345 | 165-175 |
| Melt temperature | 390 | 200 |
| Material Drying Temperature (4 Hours) | 100-120 | 40-50 |
| Mold Temperature | 50-80 | 20-30 |
| Screw Speed | 20-100RPM's | |

**(These are recommended starting parameters and may need to be optimized)**

Cereplast Compostables® are true thermoplastic, meaning that processing needs to be done below decomposition temperature, which will occur about 250°C (480°F) and above. Avoid temperatures above 220°C (425°F) (unless needed to effect processing).

***Start with "clean machine" – using either general purpose polystyrene or polyethylene as purge compound- before and after extrusion processing***

## DRYING

Thermoforming grades of Cereplast Compostables® can be amorphous or crystallized and drying temperature and time is critical to a successful process. Cereplast Compostables® are hydroscopic and will absorb a small amount of moisture from the atmosphere. The amount absorbed will depend on the environmental conditions, and the temperature and humidity of the storage area. In-line drying is recommended with Cereplast Compostables®. Standard closed loop desiccant based column driers work best. A moisture content of less than (400 ppm) is recommended to prevent viscosity and property degradation. The dew point of the air at the input of the hopper should be -40 °F or lower.

## MACHINE CONFIGURATION:

Cereplast Compostables® will process on conventional equipment. A general purpose screw designed to minimize residence time and shear works well.

- Recommend using temperature at the lowest possible setting to start - then increase to enhance flow, if needed.
- Cereplast Compostables® have reasonable wide range for process – each process unit behaves slightly different. Recommend starting at the lower settings that working up on temperature till optimal process behavior is achieved. Temperature profiles vary depending upon the output, melt temperature and roll diameter.
- Thermoforming technique will enable higher HDT in finished part with proper implementation. It is incumbent on end used to determine limit and technique since each process varies.
- Cereplast Compostables® regrind from edge trim and skeleton reclaim can be added back into the process provided that the regrind is dry. A maximum of 40% regrind is recommended to ensure smooth extrusion operation. Since regrind is amorphous it should be dried at non crystallized drying temperatures and times.
- Cereplast Compostables® have a lower glass transition/heat deflection temperature than polystyrene or polypropylene. Cycle times for thin wall parts should be similar to PS but may be longer in thicker walled parts. Storage of sheet and finished articles should be in an environment that minimizes exposure to heat, moisture and humidity. Storage temperature should be below 40°C (105°F).
- The sheet temperature should be 90 to 110°C (190-230°F) when entering the mold. The temperature should be maximized to effect crystalline behavior in formed part before sheet enters the mold with mold temperature elevated. This is determined experimentally.

**CEREPLAST, INC.**
Tel: (310) 676 5000 – Fax: (310) 676 5003
3421-3433 West El Segundo Blvd.
Hawthorne CA 90250-USA
Email: info@cereplast.com

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Tel: (310) 676 5000 – Fax: (310) 676 5003
3421-3433 West El Segundo Blvd.
Hawthorne CA 90250-USA
Email: info@cereplast.com