

MA1250P

MA1250P is a masterbatch that is composed of polylactic acid (PLA) and an amorphous polyhydroxyalkanoate (aPHA). Specifically, the aPHA used is PHACT A1000P grade from CJ Biomaterials and the PLA used is Ingeo 4032D from Natureworks. The PLA/aPHA composition of MA1250P is 55/45 by weight. This product is designed to facilitate the inclusion of amorphous PHA at desired levels by the converter, with final performance dictating the relative amount of MA1250P blended-in. MA1250P is particularly suited for film applications including biaxial orientation and blown film processing. MA1250P may be added (dry-blended with PLA) during the conversion of PLA based products to add the following performance features:

- Faster composting rate (potential for home composting; ask CJBMS technical team for details)
- Improved flexibility and film handling capability
- Significant impact toughening
- Enhanced tear propagation resistance
- Maintain the bio-based carbon content and clarity of PLA

MA1250P may also be included, by itself, in the core layers of multi-layered film structures.

Properties

Melt Index (ASTM D1238; 190 °C, 2.16 kg)	5 – 8 g/10 minutes
Density (ASTM D1505)	~ 1.22 g/cc
Glass Transition Temperature	~ -17 °C (aPHA) and ~ 60 °C (PLA)
PLA and aPHA are not miscible and the masterbatch will reveal two distinct glass transition temperatures. The values reported are based on DSC re-heat scan at 10 °C/min after cooling from 200 °C at 10 °C/min.	
Melting Temperature (of PLA)	150 to 170 °C depending on thermal/process history
Biobased Carbon Content (ASTM D6866)	100%

Safety Precautions

MA1250P must be handled and processed with adequate ventilation and proper personal protective equipment. Temperatures above 200°C (392°F) can result in considerable polymer degradation. Therefore, adequate ventilation should be provided where hot polymer may reside for long periods such as in leak areas, above the die, in screen changers, in vent ports, etc.

Drying & Moisture Management

MA1250P will be supplied in pellet form in aluminum foil-lined packaging with a moisture content of 400 ppm or less when packed. A moisture content of less than 0.04% (400ppm) is highly recommended to prevent viscosity degradation during processing. Typical drying conditions are

4 hours at 75 °C (167 °F) or to a dew point of -35 °C (-30 °F), with an airflow rate greater than 0.5 cfm/lb of resin throughput. The resin should not be exposed to atmospheric conditions after drying. Keep the package sealed until ready to use and promptly reseal any unused material.

Processing/Extrusion Details

MA1250P is not compatible with polyolefins and special care must be given to purging and cleaning the line (including feeders to avoid contamination) prior to the introduction of this product. In-line drying is recommended.

Because MA1250P is designed to be blended with PLA, processing conditions employed must be consistent with those recommended for the PLA grade used. MA1250P may be processed easily on conventional extruders with either smooth-bore feed sections or grooved-feed sections. A low shear screw with a low compression ratio (CR) is ideal for processing and performance. Recommended extrusion temperatures are as follows starting from the feed throat to the die:

Feed-Throat/Solids-Conveying/Melting/Metering Sections: 40/170/180/185 °C (104/338/356/365 °F)
 Adapters: 190 °C (374 °F)
 Die Zones: 180 °C (356 °F)

The charts below display the enhancement of impact toughness and reduction in modulus of PLA as a function of aPHA in the product; aPHA was introduced using the M1250P product.

