

PHACT™ CA1240PF

CA1240PF is compounded product 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 4043D from NatureWorks. This product is designed for blown and cast film applications; this product may also be used in biaxially-oriented films. CA1240PF has calcium carbonate compounded in.

Relative to PLA film, this product will provide the following advantages:

- Improved flexibility and film handling capability
- Ease of processing (ease of extrusion and higher specific output rate)
- Significant impact toughening
- Enhanced tear propagation resistance

PROPERTIES OF PHACT CA1240PF

Properties	Units	ASTM No	CA1240PF
Forms	-		Pellet
Specific Gravity	-	D792	1.65
Melting Point ¹⁾	°C	D3418	150 ~ 170
Glass Transition Temperature ¹⁾	°C	D3418	-17, 60
Melt Flow Rate (190 °C, 2.16 kg)	g/10 min	D1238	~5
Biobased Carbon content	%	D6866	100

1) The values reported are based on Differential Scanning Calorimeter(DSC) re-heat scan at 10 °C/min after cooling from 200°C. PLA and aPHA are not miscible and this product will reveal two distinct glass transition temperatures.

PROCESSING CONDITIONS

CA1240PF 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. This product 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 film properties.

Recommended extrusion temperatures are as follows starting from the feed throat to the die:

Feed throat	20 ~ 40 °C (68 ~ 104 °F)	Metering Sections	170 ~ 180 °C (338 ~ 356 °F)
Solids-Conveying	165 ~ 170 °C (329 ~ 338 F)	Adapters	175 ~ 180 °C (347 ~ 356 °F)
Melting	170 ~ 180 °C (329 ~ 356 F)	All Die Zones	170 °C (338 °F)

Drying Process Condition and Moisture Management

CA1240PF 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 % (400 ppm) is highly recommended to prevent viscosity degradation during processing. Typical drying conditions are 4 hours at 75 °C (167 °F) at a dew point of -35 °C (-31 °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.

BLOWN FILM PROCESSING

A spiral mandrel die is recommended for blown film processing. Ideal die-gap for blown film processing is in the range of 1.0 - 1.5 mm (40 - 60 mils). CA1270P can be processed successfully on blown film lines equipped to operate in the traditional “low stalk” bubble configuration mode with a dual-lip air ring. Chilled air supply for the air ring and internal bubble cooling (IBC) will facilitate a more stable bubble at higher line speeds. A blow-up ratio (BUR) of 2.0 to 3.0 is recommended.

Low friction bubble guides should be used to guide and center the bubble into the collapsing frame. Low web tensions (28 - 40 N/mm) should be used when processing thin films.

Properties obtained from CA1240PF blown films is listed below

(this is not meant to be a product specification, but listed only as a guide):

Properties		Units	ASTM No	CA1240PF
Tensile Modulus	MD	MPa (psi)		740 (107,300)
	TD			550 (79,750)
Tensile Elongation at Break	MD	%	D882	350
	TD			250
Tensile Stress at Break	MD	MPa (psi)		33 (4,500)
	TD			25 (3,625)
Haze		%	D1003	> 50
Elmendorf Tear	MD	grams/mil	D1922	45
	TD			35
Dart Impact Strength		grams/mil	D1709	70
Coefficient of Friction			D1894	0.268
OTR		cc/mil.100inch ² .day	D3985	< 23
WVTR		g/mil.100inch ² .day	F1249	< 21

1) Film thickness: 30µm. Crosshead speed 200 mm/min for mechanical properties.

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