

FUTERRO POLY-LACTIDE

INJECTION GRADE / *Futerro ref.*

GENERAL PURPOSE POLYLACTIC ACID / *product name*

DESCRIPTION

Futerro® PLA injection grade is a thermoplastic resin derived from annually renewable resources and is specifically designed for injection molding applications where the requirements are clarity with heat deflection temperatures lower than 55°C.

Futerro® PLA injection grade is easily processed on conventional injection equipment. The material is stable in the molten state, provided that the drying procedures are followed.

PURITY ⁽¹⁾

L-poly-Lactide content	% w/w	Min. 99
Water content	ppm	Max. 250
Free Lactide content	% w/w	Max. 0.4

PHYSICAL PROPERTIES PLA POLYMER ⁽¹⁾

Specific Gravity @25°C		1.24	ISO 1183
Melt Density @230°C		1.08-1.12	
Melt Index @190°C/2.16kg	g/10 min	10 - 30	ISO 1133
Melt Index @210°C/2.16kg	g/10 min	30 - 60	ISO 1133
Haze (2 mm)	%	< 5	ISO 14782
Transmittance (2 mm)	%	> 90	ISO 14782
Glass Transition Temperature	°C	52-60°C	ISO 11357
Crystalline Melt Temperature	°C	145-175°C	ISO 11357

MECHANICAL PROPERTIES ⁽¹⁾

Tensile Strength @ Break	MPa	55	ISO 527
Tensile Yield Strength	MPa	60	ISO 527
Tensile Modulus	MPa	3500	ISO 527
Tensile Elongation	%	6.0	ISO 527
Notched Izod Impact	kJ/m ²	3.5	ISO 180
Flexural Yield Strength	MPa	90	ISO 178

(1) Typical properties; not to be construed as specifications.

Information contained in this publication is true and accurate at the time of publication and to the best of our knowledge. The nominal values stated herein are obtained using laboratory test specimens. Before using one of the products mentioned herein, customers and other users should take all care in determining the suitability for such product of the intended use. Unless specifically indicated, the products mentioned herein are not suitable for applications in the pharmaceutical or medical sector. Futerro does not accept any liability whatsoever arising from the use, application or processing of any product described herein. No information contained in this publication can be considered as a suggestion to infringe patents. Futerro disclaims any liability that may be claimed for infringement or alleged infringement of patents.

Place d'Escauffles, 23 B-7760 Escauffles Tel. : +32 (0)69 45 22 76 Fax : +32 (0)69 45 22 97

E-mail : info@futerro.com Web Site : www.futerro.com

TVA : BE 0892 199 070 IBAN : BE12 0015 3245 4092 BIC : GEBABEBB



PROCESSING INFORMATION

Machine Configuration

Futero® PLA can be processed on conventional injection molding equipment. The material is stable in the molten state, provided that the drying procedures are followed. Mold flow is highly dependent on melt temperature. It is recommended to balance screw speed, back pressure, and process temperature to control melt temperature. Injection speed should be medium to fast.

A general purpose screw designed to minimize residence time and shear works well..

Startup and Shutdown

Futero® PLA polymer is not compatible with a wide variety of commodity resins, and special purging sequences should be followed:

- 1. Clean machine and bring temperatures to steady state with low-viscosity, general-purpose polystyrene or polypropylene.
- 2. Vacuum out hopper system to avoid contamination.
- 3. Introduce PLA polymer into the machine at the operating conditions used in Step 1.
- 4. Once PLA polymer has purged, reduce barrel temperatures to desired set points.
- 5. At shutdown, purge machine with high-viscosity polystyrene or polypropylene.

Drying

In-line drying may be required. A moisture content around 0.025% (250 ppm) is recommended to prevent viscosity degradation. For injection process, it is better to reach 0.010% (100 ppm). Typical drying conditions for crystallized granules are 2 hours at 90°C or to a dew point of -40°C, airflow rate of greater than 1.7 m³/kg per hour of resin throughput. Drying time must be increased to 3 hours or more for a 100 ppm residual moisture target. 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. Pellets that have been exposed to the atmosphere for extended time periods will require additional drying time. Amorphous regrind must be crystallized prior to drying, to assure efficient and effective drying.

PROCESSING CONDITIONS ⁽²⁾

Melt Temperature	200°C
Feed Throat	20°C
Feed Temperature (crystalline pellets)	165°C
Feed Temperature (amorphous)	150°C
Compression Section	195°C
Metering Section	210°C
Nozzle	210°C
Mold	25°C
Screw Speed	100-175 rpm
Back Pressure	3 – 7 bars
Mold Shrinkage	0.1 mm/mm. +/-0.01

(2) : These are starting points and may need to be optimized.

Information contained in this publication is true and accurate at the time of publication and to the best of our knowledge. The nominal values stated herein are obtained using laboratory test specimens. Before using one of the products mentioned herein, customers and other users should take all care in determining the suitability for such product of the intended use. Unless specifically indicated, the products mentioned herein are not suitable for applications in the pharmaceutical or medical sector. Futero does not accept any liability whatsoever arising from the use, application or processing of any product described herein. No information contained in this publication can be considered as a suggestion to infringe patents. Futero disclaims any liability that may be claimed for infringement or alleged infringement of patents.

Place d'Escauffles, 23 B-7760 Escauffles Tel. : +32 (0)69 45 22 76 Fax : +32 (0)69 45 22 97

E-mail : info@futero.com Web Site : www.futero.com

TVA : BE 0892 199 070 IBAN : BE12 0015 3245 4092 BIC : GEBABEBB



Handling and storage

Futero® PLA should be stored at ambient temperature and at atmospheric pressure in its original packaging bags. The product should be stored in dry, well-ventilated areas, and it is recommended to avoid prolonged storage under extreme temperatures, direct sunlight or other sources of radiation.

It is advisable to convert the product within 12 months after delivery, provided appropriate storage conditions are used.

Please refer to the Safety Data Sheet for further information.

CAS number	9051-89-2
------------	-----------

Information contained in this publication is true and accurate at the time of publication and to the best of our knowledge. The nominal values stated herein are obtained using laboratory test specimens. Before using one of the products mentioned herein, customers and other users should take all care in determining the suitability for such product of the intended use. Unless specifically indicated, the products mentioned herein are not suitable for applications in the pharmaceutical or medical sector. Futero does not accept any liability whatsoever arising from the use, application or processing of any product described herein. No information contained in this publication can be considered as a suggestion to infringe patents. Futero disclaims any liability that may be claimed for infringement or alleged infringement of patents.

Place d'Escanaffles, 23 B-7760 Escanaffles Tel. : +32 (0)69 45 22 76 Fax : +32 (0)69 45 22 97

E-mail : info@futero.com Web Site : www.futero.com

TVA : BE 0892 199 070 IBAN : BE12 0015 3245 4092 BIC : GEBABEBB