Biopolimer Kft.

Datasheet

PLA E-0000 TYPE
POLY(LACTIC ACID) (PLA)
BIOPOLYMER

PLA **E-0000** is a Poly(Lactic Acid) (PLA) biopolymer developed by Biopolimer Ltd. (Hungary) especially optimized for extrusion applications.

PHYSICAL PROPERTIES	
Density	1.24 g/cm^3
MFI (190°C, 2,16 kg load)	3 g/10min
Color	White
MECHANICAL PROPERTIES	
Tensile strength	45 MPa
Tensile modulus	3500 MPa
Elongation at break	~5 %
Charpy impact strength (notched)	3 kJ/m^2
Heat Deflection Temperature (HDT B)	60 °C

Recommended processing parameters

PLA **E-0000** type biopolymer can be processed using conventional extrusion equipments. The material is stable at molten state if the drying procedures and the melt-temperature recommendations were followed. A general purpose screw can be used to process the biopolymer. It is recommended to avoid too high melt temperature (>200°C), too high residence time (>5 min) and high shear rate, since all these can lead to the degradation of the material.

RECOMMENDED EXTRUSION PARAMETERS	
Melt temperature	190°C
Die temperature	190°C
Metering (homogenizing) zone temperature	185°C
Compression zone temperature	180°C
Feeding zone temperature	175°C
Screw rotational speed	10-20 m/min
Maximum residence time (at 190°C)	5 min

Recommended drying parameters

In the absence of drying, the moisture content of PLA will degrade the biopolymer by hydrolysis during processing. The drying should be performed using a dry air dryer (-40°C dew point) at a temperature between 80-100°C. In order to avoid significant degradation during melt state processing, the moisture content must be decreased below 250 ppm (0.025%). In such processing technologies, where the viscosity of the material highly influences the process-ability (like extrusion blow molding), it is recommended to decreased moisture content below 100 ppm (0.010%). The necessary minimum drying times are listed below.

DRYING TEMPERATURE	ACHIEVABLE MAXIMUM MOISTURE CONTENT	NECESSARY MINIMUM DRYING TIME
80°C	250 ppm (0.025%)	4 hours
	100 ppm (0.010%)	6 hours
100°C	250 ppm (0.025%)	2 hours
	100 ppm (0.010%)	3 hours

If the material is dried at higher temperature, it may lead to its hydrolytic degradation, at the same time, for a short time (maximum 2 hours) even 120°C drying temperature may be allowed for a quick drying of the material. The dried material should not be exposed to normal atmospheric conditions, since it will take up moisture again. The dried but not processed material should be put back into the packaging and sealed air-tight as far as possible.

Startup of the machine, material changing to biopolymer

PLA and PLA based biopolymers are not compatible with the generally used plastics like PE, PP, PA, PET, ABS, PC or PVC, thus the following steps are necessary to change the material for processing biopolymers:

1) Purge barrel with low viscosity Poly(Propylene) at the same melt temperature as the previously processed material, but at least at 190°C
2) Remove any residual pellet in the hopper
3) Set the melt temperature to 190°C (190-185-180-175°C from nozzle to hopper)
4) Feed biopolymer into extruder, purge multiple times (3-5) and process the biopolymer into product/compound
5) After production, purge the barrel with low viscosity Poly(Propylene) again

Storage

PLA and PLA based biopolymers should be kept sealed in their original packaging until drying and processing. During storage, the material should not be exposed to temperature higher than 40°C, to direct sunlight and to higher than 80% relative humidity. The dried material should not be exposed to normal atmospheric conditions, since it will take up moisture again. The dried but not processed material should be put back into the packaging and sealed air-tight as far as possible.

Combustibility

PLA and PLA based biopolymers are combustible and burn with a clear to white smoke. PLA will turn into carbon-dioxide in case of complete combustion, without any residue, at the same time, in case of incomplete combustion, carbon-monoxide could also develop. The burning material or product should be extinguished using water, at the same time, foam or carbon-dioxide extinguishing can also be applied.

Disposal and environmental concerns

Do not dump PLA and PLA based biopolymer pellets or products into sewers and do not place into/onto soil or in landfills for disposal. The uncontaminated biopolymer products should be reprocessed by adding 10-40wt% of re-pelletized biopolymer to virgin material. Contaminated, not to be reprocessed biopolymer material or products must be disposed be in compliance with Federal, State/Provincial, and local laws and regulations in industrial composting facility or in an incinerator based on the extent of contamination.