

ArcBiox™ materials are biodegradable glass fiber reinforced^{)} or unreinforced composites. These high performance biocomposites provide sustainable green alternatives for demanding technical applications.*

^{)} The proprietary fiber technology of Arctic biomaterials Oy is based on Long Fiber reinforced Thermoplastic (LFT) technology.*

ArcBiox™ f-A2

Food contact approved, mineral filled PLA (Polylactic acid) for injection moulding applications

- ✓ PLA is made from 100% renewable resources
- ✓ Increased end-of-life options
- ✓ Good flowability
- ✓ Excellent flatness & dimensional stability
- ✓ Good surface quality

Property	Typical value	Test method
Density	1.25 g/cm ³	ISO 1183 A
Tensile strength at break	66 MPa	ISO 527
Flexural strength	129 MPa	ISO 178
Flexural Modulus	6740 MPa	ISO 178
Izod impact strength	34 kJ/m ²	ISO 180/U
Izod notched impact strength	6 kJ/m ²	ISO 180/A
Heat Deflection Temperature HDT/B	130 °C	ISO 75
Vicat softening temperature/ B50	100 °C	ISO 306

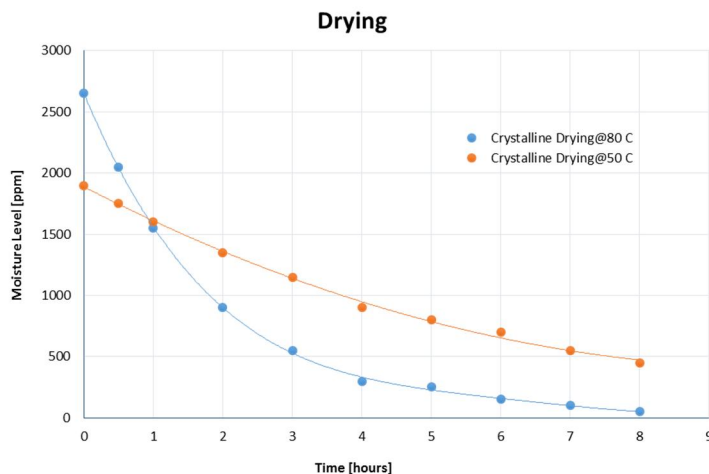
*The properties stated above are not for specification purposes.
Mould temperature of 110 °C used.*

ArcBiox™ f-A2 is a possible alternative for applications where currently unreinforced resin like SAN, PP, ABS is used.

Best Practices: Injection moulding of ArcBiox™ Materials

Drying

ArcBiox™ materials must be always dried before processing with dehumidifying dryer, due to fact that insufficient drying before processing will cause loss of mechanical properties. Please note that a combination of a very long drying time and high temperature may cause degradation and agglomeration of pellets and may cause yellowing.



Moisture content of less than 0.025% (250 ppm) is recommended to prevent loss of mechanical properties.

Recommended drying time

80 °C 4-5 h

In order to avoid moisture pick-up during processing, the following points should be followed:

- Remaining granules should be stored in air-tight containers
- Residence time inside the hopper should stay below 1 hour
- Dry-air filters should be used in hot-humid climate conditions
- Do not open cold material containers inside normal temperature environment as the granules will act as condensation points (bring containers into production some hours before use)
- Empty machine hopper and store material air-tight in case of production stops

Screw & barrel

When using ArcBiox™ unreinforced grades wear protected conventional 3-zone screws with L/D-ratio between 18:1 and 22:1 and low compression ratio of 2:1 to 2.5:1 are recommended. Proposed flight depth for metering zone is at minimum 3.5 mm and for feed zone 7.5 mm.

Nozzle

General purpose nozzle tips are recommended. The configuration of the bore of the nozzle should closely correspond to the screw tip and the diameter of the nozzle bore must be slightly smaller than the outer sprue bush diameter to allow demolding of the sprue and runner.

Hopper & other connections selection

The hopper should have, preferably, a discharge angle of at least 45°, better 60 °C, flat bottoms and long transition tubes to the feed throat must be avoided. Small feed throat diameters and safety bars, magnets or other inserts can lead to flow stagnations. Allow at least 15 mm free space for the pellets to move. All inside seams must be flush, circular sections are preferred over rectangular flow channels.

Tooling

Due to low shrinkage of material draft angles need to be higher. Following table should be considered in part design on visual surfaces

VDI 3400 ref	12	15	18	21	24	27	30	33	36	39
Ra (µm)	0.4	0.56	0.8	1.12	1.6	2.24	3.14	4.5	6.3	9
Draft angle	1.5	2	2.5	3	3.5	5	4.5	5	5.5	6

Gate should be located in thickest section of the part and recommended size is 0.8 x wall thickness and also round sprues are recommended with diameter of 1.5 x biggest wall thickness. Venting of the tool is very important to avoid burn marks and flashes, where proposed venting depth 0.01 mm and venting channel distance from cavity edge 2-2.5 mm.

Processing Parameters

Melt Temperature	180 – 200 °C
Feed Throat	30 – 50 °C
Feed Temperature	160 – 190 °C
Compression Section	170 – 190 °C
Metering Section	180 – 200 °C
Nozzle	180 – 200 °C
Screw Speed	low to medium
Back Pressure	5 – 10bars (0.5 – 1.0MPa)
Change-over point	Change-over point should be always checked visually by setting holding pressure to 0 bar/MPa to avoid over filling and flashes. Part should be 95 – 98% filled before changing to holding pressure.
Holding pressure	60% of max injection pressure
Mold Temperature	30 – 40 °C amorphous (notice after crystallization risk) 100 – 120 °C crystalline (shrinkage 0.9-1.2% with tool dimension 4x70x150 mm)
Cooling time	Minimum cooling time is 50s with high tool temperature (holding pressure time is part of cooling time and can be decreased from this value) to enable good crystallization level with relatively thick walled products >3 mm
Purging / Cleaning of screw	Use low MFR Polypropylene to clean the screw and barrel

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