*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™ SGF15-A15

## Short fiber reinforced UV stabilized PLA (Polylactic acid) for injection moulding

- ✓ Good impact properties
- ✓ Good flowability
- ✓ Good visual surface
- ✓ Good dimensional stability

| Property | Typical value | | Test method |
|---|---|---|---|
| Density | 1.4 | g/cm$^3$ | ISO 1183 A |
| Tensile strength at break | 86 | MPa | ISO 527 |
| Tensile Strain | 1.8 | % | ISO 527 |
| Flexural strength | 138 | MPa | ISO 178 |
| Flexural Modulus | 7350 | MPa | ISO 178 |
| Izod impact strength | 22 | kJ/m$^2$ | ISO 179/1eU |
| Izod notched impact +23 °C | 6 | kJ/m$^2$ | ISO 179/1eA |
| HDT/A (1.8 MPa) | 108 | °C | ISO 75 |

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

Arctic Biomaterials Oy
Osuusmyllynkatu 13
33700 Tampere, Finland

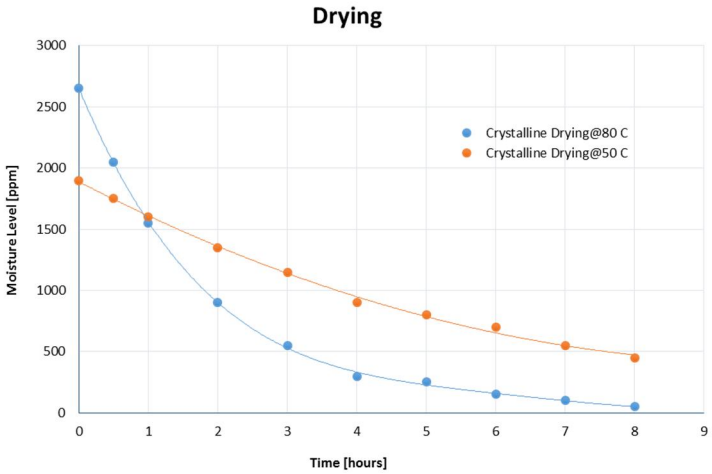
www.abmcomposite.com

info@abmcomposite.com
+358 10 325 5500

# 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™ glass fiber reinforced 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.
Screws with integrated mixing elements, venting screws with double compression zones or screws with other shear elements are not recommended for the processing of ArcBiox™ glass fiber reinforced grades.

## Nozzle

General purpose nozzle tips are recommended. Open nozzles are preferred to nozzles equipped with shut-off devices. 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.

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## Tooling

Due to low shrinkage of material draft angles need to be higher than with unreinforced grades. 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 0.01mm and venting channel distance from cavity edge 2-2,5mm.

## 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 – 210 °C |
| Screw Speed | low to medium to avoid glass fiber breakage |
| Back Pressure | 3 – 5 bars (0.3 – 0.5 MPa) |
| 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 – 50 °C amorphous (shrinkage 0.02 – 0.05%, notice after crystallization risk)<br>100 – 120 °C crystalline (shrinkage flow 0.15%, xflow 0.5% with tool dimension 4x70x150 mm) |
| Cooling time | Minimum cooling time is 50s (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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