



# Technical Information

## bioFila® silk & linen

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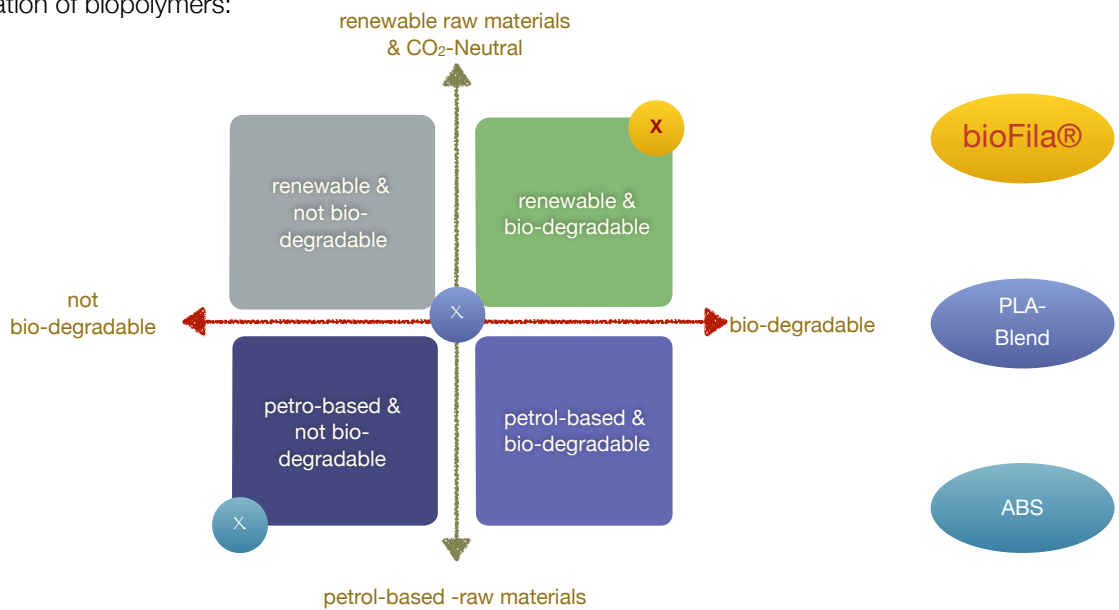
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## GENERAL INFORMATION

bioFila® silk and bioFila® linen are compounds of biopolymers designed for 3D printing and also qualified for extrusion and injection molding.

The newest material information you'll find on our homepage: <http://www.two-bears.eu>, section data sheets.

Ender's classification of biopolymers:



## QUALIFICATION & CERTIFICATS

### Renewable raw material

Our material are made out of biopolymers, which were produced out of renewable raw material, like wood, stark, lignin and we ensure, that they are not out of the food chain.

These resources do not depend on speculation of raw oil prices and they will be available in future, even after petrol time.

### Bio-degradable

bioFila® silk and bioFila® linen are both tested and conform with DIN/ISO 14851/14852.

That means that the material is biodegradable like wood and will be complete re-integrated in natural process and do not pollutes the environment, like standard plastics.

No waste, no impact to the environment and humans. The perfect material for the industrial future.

### Food-save material

The material is tested as food-safe and is conform with the following standards

#### bioFila® linen:

EG 1935/2004 from 13.11.2004

Germany: Lebensmittel-, Bedarfsgegenstände- und Futtermittelgesetz (LFGB from 24.07.2009)

EU 10/2011 from 14.01.2011

#### bioFila® silk:

EG 1935/2004 from 13.11.2004

Germany: Lebensmittel-, Bedarfsgegenstände- und Futtermittelgesetz (LFGB from 24.07.2009)

EU 10/2011 from 14.01.2011

#### U.S. Food and Drug Administration(FDA)

21 CFR § 177.1660 21 CFR § 182

21 CFR § 184

21 CFR § 186

21 CFR § 175.105 "Adhesives"

21 CFR § 175.300 "Resinous and polymeric coatings"

21 CFR § 176.170 "Components of paper and paperboard in contact with aqueous and fatty foods"

21 CFR § 176.200 "Defoaming agents used in coatings"

21 CFR § 177.2600 "Rubber articles intended for repeated use"

21 CFR § 178.2010 "Antioxidants and/or stabilizers for polymers".

### Reach Conformity

Our material is conform with the REACH requests. A certificate is available on our homepage.

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## 3D PRINTING PARAMETERS

### Temperatures & speed

Depending for the printer the temperatures should be in the following range:

Product	Dim.	bioFila® silk	bioFila® linen
Hotend	(°C)	165-195	175 -230
Heat-bed	(°C)	55°C	55°C
speed	mm/sec	30 - 90	30 -90
decomposition temperature	°C	215	235

#### Attention:

Please be aware, that you will get a change in the surface if you print higher than the decomposition temperature.

With bioFila® linen you can change the surface form smooth to rough if you printer with a higher temperature than 205°C. That can be used for some very interesting special effects and designs.

### Start easy printing

The printing with bioFila is very easy. Here a short description how to start.

1. Start in park position and with the lowest temperature (see table)
2. Try to extrude with your hot-end 10mm material.
3. If the material sticks, increase the temperature by 5 degrees and continue with point 2 until the material start to flow. This is the minimum temperature for printing.
4. With 10 degree higher than the minimum temperature you will have the best process temperature for printing with the lowest speed (here 30mm/sec)

### Optimization of printing

If you want to increase the speed of printing you normally need some optimization loops.

As rule of thumb you should increase the temperature by 10°C if you print 20mm/s faster.

At the end the sojourn time is responsible for the material temperature, which should not be higher than the decomposition temperature. If you print with very high speed, you have to minimize the ramp-up and stop times to prevent / minimize a decomposition of the material.

For any problems with the printing, don't hesitate to contact us and we will help you to solve it.

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## EXTRUSION & INJECTION MOLDING

Both materials are tested for injection molding and extrusion, so it's easy for you to use prototype parts out of the 3D printer and transfer the results to a mass production line. General you will get better mechanical results in your extrusion or injection molding than in 3D-printing. That will be a safety margin for your design.

You will be faster and better if you use bioFila® from design to production.

For any question or support, don't hesitate to contact us.

## MATERIAL DATA OVERVIEW

### bioFila vs. PLA & ABS

Measurement	Test method	Dim.	bioFila silk	bioFila linen	PLA	ABS
Density 23°C	DIN EN ISO 1183	g/cm <sup>3</sup>	1,25	1,40	1,28	1,07
Tensile test Stress at yield	DIN EN ISO 527-2	MPa	53	51	55	48
Tensile modulus	DIN EN ISO 527-1	GPa	2,50	2,70	5,10	2,20
Charpy impact strength 23°C	DIN EN ISO 179/1eU	kJ/m <sup>2</sup>	60	58	8	55
Softening temperatur (Vicat / VST A50)	DIN EN ISO 306	°C	57	58	60	100
Melding temperature	ISO 11357	°C	165	153	180	180

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