

## Technical data sheet

**Product name:** Bio-Flex<sup>®</sup> V 135001 (trial grade)  
**Date of issue:** 28 July 2014

Version: 4.0

### Designation of product, preparation and manufacturer

**Trade name:** Bio-Flex<sup>®</sup> V 135001 (trial grade)  
**Use of product:** Polymer blend based on poly lactid acid, suitable for the production of 3D printing filaments.  
**Manufacturer:** FKUR Kunststoff GmbH  
 Siemensring 79  
 D - 47 877 Willich  
 Phone: + 49 (0) 2154 / 92 51-0  
 Fax: + 49 (0) 2154 / 92 51-51  
 Mail: info@fkur.com  
 Web: www.fkur.com

### Mechanical properties

Modulus of elasticity	2,960	[MPa]	ISO 527
Tensile strength	61.5	[MPa]	ISO 527
Tensile strain at tensile strength	5.3	[%]	ISO 527
Tensile stress at break	38	[MPa]	ISO 527
Tensile strain at break	10.5	[%]	ISO 527
Flexural modulus	3,295	[MPa]	ISO 178
Flexural strain at break	no break	[%]	ISO 178
Flexural stress at 3.5 % strain	88.8	[MPa]	ISO 178
Notched impact strength (Charpy), RT Impact Strength (Charpy), RT	2.8	[kJ/m <sup>2</sup> ]	ISO 179-1/1 eA
Shore D hardness	n/a	[-]	DIN 53505
Density	1.24	[g/cm <sup>3</sup> ]	ISO 1183
Bulk density	n/a	[kg/m <sup>3</sup> ]	ISO 60

The values listed have been established on standardized test specimens (DIN EN ISO 3167, type A) at standard temperature and humidity conditions.

### Thermal properties

Melting temperature	> 155	[°C]	ISO 3146-C
Vicat A softening temperature Heat distortion temperature HDT B	n/a	[°C]	ISO 306
	n/a	[°C]	ISO 75
Melt volume rate (190 °C/2.16 kg)	n/a	[cm <sup>3</sup> /10 min]	ISO 1133
Melt flow rate (190 °C/2.16 kg)	3.0 - 5.0	[g/10 min]	ISO 1133

### Legal notice

The figures should be regarded as guide values only. Under certain conditions the properties can be influenced to a significant extent by the processing conditions.

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The current version of General Conditions of Sale of FKUR Kunststoff GmbH is valid.

The brands „FKuR – Plastics made by nature“ and “BIO-FLEX“ are registered trademarks of FKUR Kunststoff GmbH, according to the international `Nice-Classifications' (NCL9), no. 01, 02 and 17.

## Technical data sheet

Product name:  
Date of issue:

**Fibrolon<sup>®</sup> V 135002 (trial grade)**  
18 December 2014

Version: 1.1

### Designation of product, preparation and manufacturer

Trade name: Fibrolon<sup>®</sup> V 135002 (trial grade)  
Use of product: Polymer blend based on poly lactid acid, suitable for the production of 3D printing filaments. Contains wood fibers.  
Manufacturer: FKUR Kunststoff GmbH  
Siemensring 79  
D - 47 877 Willich  
Phone: + 49 (0) 2154 / 92 51-0  
Fax: + 49 (0) 2154 / 92 51-51  
Mail: info@fkur.com  
Web: www.fkur.com

### Mechanical properties

Modulus of elasticity	3,290	[MPa]	ISO 527
Tensile strength	46.0	[MPa]	ISO 527
Tensile strain at tensile strength	4.8	[%]	ISO 527
Tensile stress at break	42	[MPa]	ISO 527
Tensile strain at break	5.5	[%]	ISO 527
Flexural modulus	3,930	[MPa]	ISO 178
Flexural strain at break	5	[%]	ISO 178
Flexural stress at 3.5 % strain	70	[MPa]	ISO 178
Notched impact strength (Charpy), RT	4.2	[kJ/m <sup>2</sup> ]	ISO 179-1/1 eA
Impact Strength (Charpy), RT	19.0	[kJ/m <sup>2</sup> ]	ISO 179-1/1 eU
Shore D hardness	n/a	[-]	DIN 53505
Density	1.15	[g/cm <sup>3</sup> ]	ISO 1183
Bulk density	n/a	[kg/m <sup>3</sup> ]	ISO 60

The values listed have been established on standardized test specimens (DIN EN ISO 3167, type A) at standard temperature and humidity conditions.

### Thermal properties

Melting temperature	> 155	[°C]	ISO 3146-C
Vicat A softening temperature	n/a	[°C]	ISO 306
Heat distortion temperature HDT B	n/a	[°C]	ISO 75
Melt volume rate (190 °C/2.16 kg)	n/a	[cm <sup>3</sup> /10 min]	ISO 1133
Melt flow rate (190 °C/2.16 kg)	4.0 - 7.5	[g/10 min]	ISO 1133

### Legal notice

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## Safety Data Sheet

according to EU Directive 1907/2006

**Product name:** **Bio-Flex® V 135001**      Version: 1.0  
Date of issue : 14 February 2014

### 1. Identification of the substance/preparation and of the company

1.1 Trade name: Bio-Flex® V 135001  
1.2 Use of the product: Biodegradable resin for extrusion.  
1.3 Supplier: FKUR Kunststoff GmbH  
Siemensring 79  
D - 47 877 Willich  
Phone: +49(0) 2154-9251-0      Fax + 49(0) 2154-925151  
Emergency phone number: +49 2154-9251-0

### 2. Hazards identification

2.1 Classification: Not dangerous according to Directive 67/548/EEC  
2.2 Special advice on hazards: Danger of burns in contact with hot polymer.  
Hazardous vapours in case of burning.

### 3. Composition / information on ingredients

3.1 Chemical characteristics: Biodegradable polymer-blend based on polylactic acid.  
3.2 CAS no: PLA : 9051-89-2  
3.3 Additional information: no harmful ingredients

### 4. First-aid measures

4.1 On skin contact: In case of contact with molten polymer immediately cool the skin with cold water. Medical aid may be required to remove adhering material and for treatment of burns.  
4.2 After inhalation: After inhalation of decomposition gases or dust remove patient to fresh air. Contact a doctor in case of discomfort.  
4.3 On ingestion: No effects known. Rinse mouth with water and drink more water. Contact a doctor in case of discomfort.  
4.4 On eyes contact: Rinse open eyes thoroughly with water

### 5. Fire-fighting measures

5.1 Suitable fire extinguishing media: water, dry chemical extinguisher, carbon dioxide  
5.2 Special exposure hazards: During incomplete combustion release of carbon monoxide, carbon dioxide and hydrocarbons.  
5.3 Special protective equipment: Self-contained breathing apparatus  
5.4 Remark: Accumulations of dust can be inflammable.

## Safety Data Sheet

according to EU Directive 1907/2006

### Product name:

**Bio-Flex® V 135001**

Date of issue :

14 February 2014

Version:

1.0

### 6. Accidental release measures

- 6.1 Personal precautions: Use suitable protective clothing. Avoid eye contact and inhalation of dusts. Keep ignition sources away.
- 6.2 Methods for cleaning up: Sweep up material and place in a container, risk of slipping. Avoid ingress of material into drainage systems.

### 7. Handling and storage

- 7.1 Handling: Avoid contact with molten polymer. Avoid generation of dust and electrostatic charge.
- 7.2 Storage: Protect against moisture. Store cool and keep packaging closed when not in use. Avoid sources of ignition.

### 8. Exposure controls/ personal protection

- 8.1 Technical safety measures: With suitable ventilation the threshold limits assumably will not be reached. Avoid electrostatic charge by use of grounding cables.
- 8.2 Personal safety equipment: Use adequate safety equipment, e.g. protective clothing, eye protection glasses, heat protection gloves. In case of dust formation wear mask with particle filter.
- 8.3 Work hygiene: No eating or drinking during working. Avoid contact of hot material with the skin. Avoid breathing dust and vapours.

### 9. Physical and chemical properties

- 9.1 Form: Granules
- 9.2 Colour: nature
- 9.3 Odour: almost odourless
- 9.4 Melting range: 150 - 170 °C
- 9.5 Oxidising properties: not self igniting / flammable
- 9.6 Explosions limits: not applicable
- 9.7 Density: 1.2 - 1.3 g/cm<sup>3</sup>
- 9.8 Solubility in water: insoluble

### 10. Stability and reactivity

- 10.1 Stability: The product is stable at recommended storage conditions.
- 10.2 Conditions to be avoided: Avoid exposure to extreme heat and all sources of ignition. Thermal decomposition > 240°C.
- 10.3 Substances to be avoided: Strong oxidizing agents
- 10.4 Hazardous decomposition products: Carbon monoxide, carbon dioxide, hydrocarbons.

## Safety Data Sheet

according to EU Directive 1907/2006

**Product name:** Bio-Flex® V 135001

Date of issue :

14 February 2014

Version: 1.0

### 11. Toxicological information

- 11.1 Local irritation: Dust can cause irritation of eyes, respiratory organs and skin. After ingestion stomach pain or nausea are possible.
- 11.2 Other remarks: Based on our state of knowledge and experience no injurious health effects are expected if product is properly handled for the designated use.

### 12. Ecological information

- 12.1 Ecotoxicological effects: No negative ecological effects known at the present state of knowledge, test results are not available. Due to insolubility in water most probably not hazardous to aquatic organisms.
- 12.2 Biological degradation: Product is biodegradable.
- 12.3 Bioaccumulation: Due to its consistency and insolubility in water biological accumulation is not expected.

### 13. Disposal considerations

- 13.1 Product : Generation of waste should be minimised, check possibility for recycling. Waste product can be incinerated or dumped together with domestic waste in compliance with local authority requirements.
- 13.2 Uncleaned packaging: Packaging material has to be emptied completely and disposed in accordance with the regulations. Packaging can be recycled if not contaminated.

### 14. Transport information

- 14.1 Transport regulations: Not classified as hazardous under transport regulations ADR, ADNR, RID, ICAO/IATA, IMDG/GGVSee, ICAO/IATA

### 15. Regulatory information

- 15.1 EU regulations: This product does not require a hazard warning label in accordance with EC Directives.
- 15.2 Water exposure class (Germany): 'nwg', no risk of water pollution (classification acc. Att. 1 of VwVwS)

### 16. Other information

This data is based on the current state of our information and experience. This safety data sheet describes our product in terms of safety requirements. Preceding data is not applicable as a warranty of product properties.

It is the responsibility of the recipient to observe the existing legal regulations for the use of this product.

## Declaration of Compliance

according to Regulation (EU) 10/2011 Annex IV

### - Bio-Flex<sup>®</sup> V 135001 -

#### Manufacturer:

**FKuR Kunststoff GmbH**  
Siemensring79

D – 47877 Willich

**Bio-Flex V 135001** is in compliance with the following legal requirements (in each case including all amendments in their relevant versions up to the time of the issue of this statement):

### European Union (EU)

#### General

- EU-Framework Regulation on materials and articles intended for food contact: (EC) No **1935/2004** of 27 October 2004
- **German Lebensmittel-, Bedarfsgegenstände- und Futtermittelgesetzbuch (LFGB)** of 07 September 2005
- EU-Regulation on good manufacturing practice for materials and articles intended to come into contact with food: (EC) No. **2023/2006** of 22 December 2006

#### Raw Materials

In the manufacture of **Bio-Flex V 135001** only substances are used listed in Annex I of Regulation **EU No 10/2011** of 14. January 2011.

### Conditions of use / Compliance with threshold values

#### Specification of the intended use or limitations

**Bio-Flex V 135001** is suitable for packaging in dry, aqueous, acetic and fatty foodstuffs at any condition of time at room temperature and below.

#### Overall Migration

Overall Migration was carried on comparable products under following contact conditions (EC-Directives **85/572/EWG** and **82/711/EWG** amended by **93/08/EWG** and **97/48/EG**):

Simulant	Contact Time [d]	Temperature [°C]
Iso-octane	2	20
3% acetic acid	10	40
50% ethanol	10	40
95% ethanol	10	40

Overall Migration is well below the limit of  $10 \text{ mg/dm}^2$  without application of permitted reduction factors for the above stated conditions of use.

### Limitations and/or specifications

For the following substances used in the production of **Bio-Flex V 135001** limitations and/or specifications have been stipulated in Regulation **EU No 10/2011**:

Substance name	FCM substance No	SML [mg/kg]	SML (T) [mg/kg] (Group restriction No)	Restrictions and specifications
-				

### Dual Use Additives

In the manufacture of **Bio-Flex V 135001** the following substances are used which are subject to a restriction in food.

Substance name	FCM substance No / CAS No	E-number
lactic acid	99 / 50-21-5	E 270

### Summary

By observing the above regulations, the duty of care regarding the compliance of the product with legislation governing food contact applications has been fulfilled. It is the responsibility of the user to verify its suitability for his own intended food application. In particular according to Regulation (EU) 10/2011 verification of compliance with the migration limits is within the responsibility of the manufacturer of the finished plastic food contact material or article. No liability for losses arising from the inadequate suitability of the product for the particular content being used is accepted.

The declaration is based on information made available by FKUR Kunststoff GmbH and their suppliers to fcc-foodcontactconsulting gmbh by date.

The content of this certificate is strictly confidential and should not be passed on to third parties. However in case your customer requires this information in order to assess compliance and measuring migration as required by law, you are entitled to pass them on to the customer or a neutral institute, under the strict obligation that the information is treated strictly confidential.

This declaration shall continue in effect for 1 year from its effective date unless it is modified before. The validity also ends upon change of the corresponding legislations. If further information is required please do not hesitate to contact us.

Date of Declaration: 22.04.2014



Claudia Wehmeier  
Certified food chemist

fcc-foodcontactconsulting  
gmbh Kästnerstr. 1a  
74889 Sinsheim  
[c.wehmeier@foodcontactconsulting.de](mailto:c.wehmeier@foodcontactconsulting.de)