

# BioFoam®

100% bio-based PLA Foam

**BioFoam®** is a 100% bio-based PLA foam made from Synterra® PLA. Physically and mechanically comparable to EPS (expanded Polystyrene), it can be applied in loose bead applications, like bean bags, and in shape moulded parts.

BioFoam® is already used for cooled transport and protective packaging and as a highly sustainable alternative for applications in the construction and insulation market.

BioFoam® is certified industrially compostable according to EN 13432 and is Cradle-2-Cradle<sup>SM</sup> Silver certified.



## BioFoam® Typical Properties

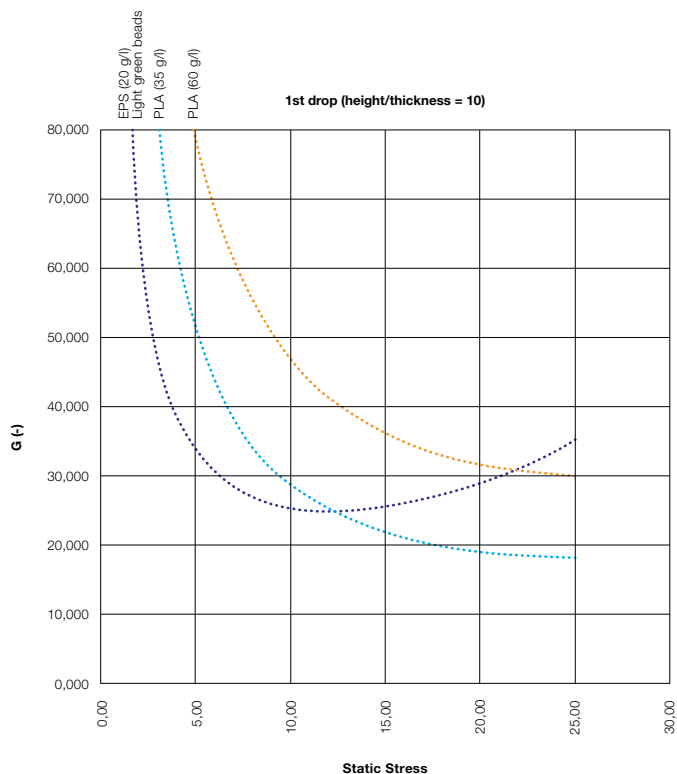
Physical properties	Test method	Units	Specification						
Colour and Form of feedstock	-	-	Light green beads						
Bulk Density (in octabin)	ISO 1183	g/cm <sup>3</sup>	0,66						
VOC Content	-	%	0						
Moisture content	-	%	< 2						
Thermal insulation properties Comparison EPS and BioFoam®	ISO 2796-1980	°C	<table border="1"> <thead> <tr> <th>Thermal Insulation W/mK*</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>0,034 at 35 kg/m<sup>3</sup></td> <td>BioFoam®</td> </tr> <tr> <td>0,033 at 30 kg/m<sup>3</sup></td> <td>EPS</td> </tr> </tbody> </table>	Thermal Insulation W/mK*	Type	0,034 at 35 kg/m <sup>3</sup>	BioFoam®	0,033 at 30 kg/m <sup>3</sup>	EPS
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Flame retardant properties	EN 11925-2:2002	%	Meets Euroclass E for 30-40 kg/m <sup>3</sup> Test report R0529 Effectis (TNO) dd 22-4-2010						
Flame retardant properties	DIN 4102-1	°C	Überwachung-Controlled by MPA NRW Meets all the requirement of class B2 No after burning observed.						
Flame retardant properties	BS-5852	°C	Meets Class crib 5, suitable as filling in bags for public areas. Crib 5, comparable to the energy of a compressed burning paper.						

## BioFoam® Mechanical Properties

Mechanical Properties	Units	Specification
Thermal conductivity	mW/m·K	35 g/l - 34
Bending strength	kPa	35 g/l - 200-250
Compressive stress @ 10% deformation	kPa	40 g/l - 150-200
Compressive modulus	MPa	40 g/l - 4.0
Shear strength	kPa	35 g/l - 150-200
Shear modulus	MPa	35 g/l - 2.7
C-value (for drop testing)	-	35 g/l - 2.6

### Cushioning

Dynamic Shock Cushioning Characteristics of Packaging Materials mentioned in ASTM norm 1596. (Sample 60 x 60 x 2,5 cm, height 76 cm, 10kg drop, 35 kg/m<sup>3</sup>, First drop 25G).



### Properties

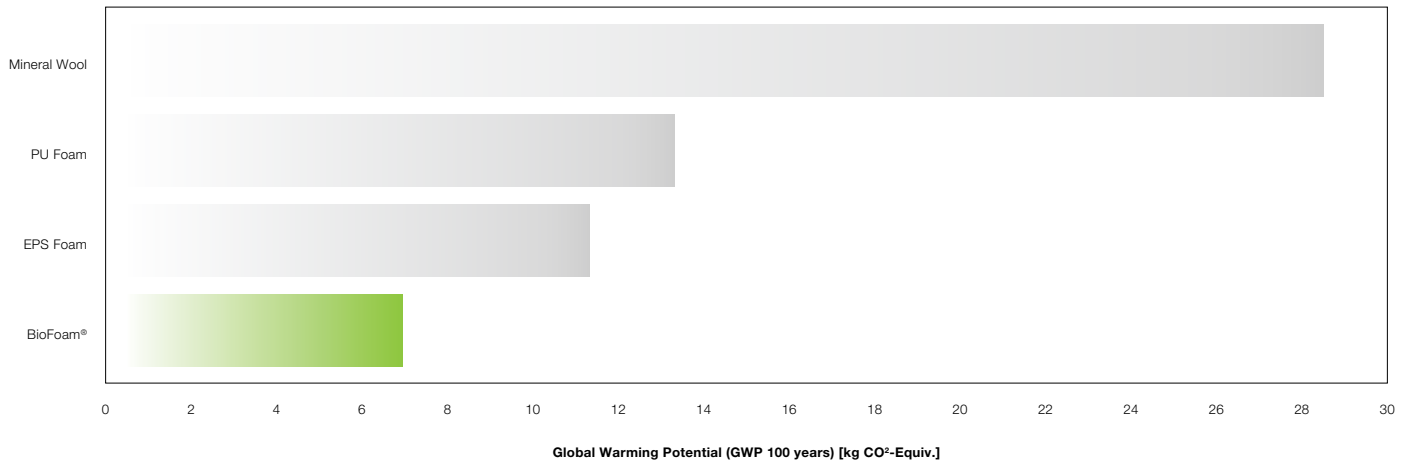
BioFoam® has been specially developed to serve as a feedstock for shape moulding. Minimal Achievable density 30 kg/m<sup>3</sup>, in one pass, typical range 25-50 kg/m<sup>3</sup>.

### ROHS listing

All ingredients in BioFoam® comply with European Directive EC1994/45/EC with regard to absence of heavy metals and mutagenic and carcinogenic substances, and therefore also complies with European Directives 2002/95/EC and 2000/53/EC.

## CO<sup>2</sup> footprint

BioFoam® has a very low CO<sup>2</sup> footprint compared to other materials and is even better than the already very good insulant EPS. The emissions of CO<sup>2</sup> to produce a functional unit for a flat roof which is walkable and has an Rc of 3,5 are shown below. A formal LCA has been completed by Akzo Nobel sustainable systems and was peer reviewed.



## Chemical resistance against solvents

BioFoam® is hardly attacked by styrene solvent present in curing formulations and has been used successfully as a sustainable filler, saving weight during thermosetting polyester/styrene/glass-fibre systems. It thus enabled a contribution to a reduction of styrene emission during the subsequent curing process and assists in mitigating styrene emission according to the tightened Dutch Emission (NER) guidelines per 30 November 2010.

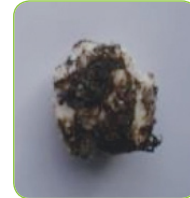
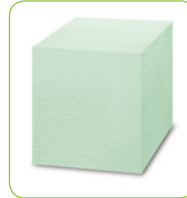
## Termite test

BioFoam® is not sensitive to attack by termites conform the standard EN 117/118

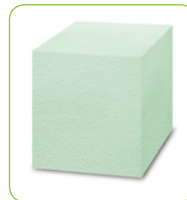


## Composting

BioFoam® disintegrates only during Industrial composting at 70°C under the influence of moisture, bacteria and constant agitation.



BioFoam® at 35 g/l does not disintegrate after 26 weeks of composting at room temperature at 30°C. BioFoam is therefore not home compostable as proven by tests carried out by a certified laboratory, finished March 2010. Test was terminated according to the norm without visible alteration.



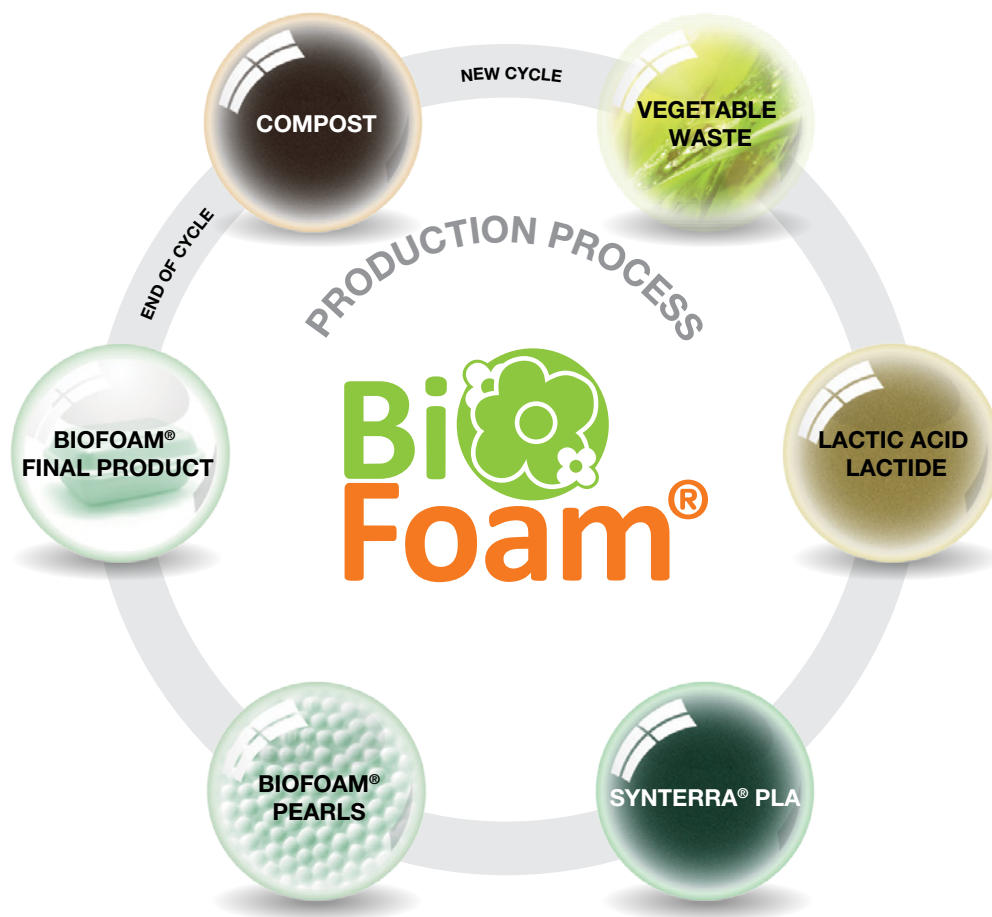
**Cradle to Cradle<sup>SM</sup> certification**

BioFoam<sup>®</sup> was recertified by EPEA to meet the stringent Cradle to Cradle<sup>SM</sup> requirements.



**Awards**

BioFoam<sup>®</sup> was awarded the first position of the 2010 MKB Top 100 innovation on May 25th 2010.



Note: Information contained in this data-sheet is given in good faith and to the best of the knowledge and belief of Synbra Technology bv (The Company) is accurate. The properties of plastics set out herein are typical values and do not constitute a specification. It is at all times the responsibility of the customer to ensure that materials supplied by the Company are suitable for the purpose for which they are intended. The Company accepts no liability whatsoever arising out of the use of the information herein contained or the use, application, adaptation or processing of the products herein described.