

## PRODUCT INFORMATION

# Solanyl<sup>®</sup> C2002

Solanyl<sup>®</sup> C2002 is developed for extrusion applications.

Solanyl<sup>®</sup> C2002 is a biodegradable granulate based on reclaimed potato, grain, root or seed flour based resources.

## APPLICATION

Solanyl<sup>®</sup> C2002 is an end compound suitable for extrusion. Solanyl<sup>®</sup> C2002 can be processed on conventional extrusion lines. Solanyl<sup>®</sup> C2002 is a competitive alternative for currently used biodegradable plastics, like PP, HIPS & PS for a wide range of applications. Solanyl<sup>®</sup> C2002 can be mixed with most biopolyesters or starch based plastics to reduce costs. Solanyl<sup>®</sup> C2002 has a natural feel and look. Solanyl<sup>®</sup> C2002 is biodegradable and has a biobased or plant based content of >60%.

Applications in which Solanyl<sup>®</sup> C2002 can be used are:

- Consumer goods & Packaging
- Agriculture products
- Thermoform applications
- Cups, boxes & trays
- Plates and sheets
- Groundwork applications like pipes
- Extruded profiles

## PROPERTIES

Parameter#	Guide value	Unit	Test method
<b>Mechanical properties MD</b>			
E-modulus MD	1,5-20	MPa	ISO 527
Tensile stress MD	29-34	MPa	ISO 527
Tensile stress at break MD	22-34	MPa	ISO 527
Strain at yield MD	6	%	ISO 527
Strain at break MD	130-170	%	ISO 527
<b>Mechanical properties CD</b>			
E-modulus CD	1,5	MPa	ISO 527
Tensile stress CD	13-16	MPa	ISO 527
Tensile stress at break CD	14-15	MPa	ISO 527
Strain at yield CD	4-6	%	ISO 527
Strain at break CD	50-90	%	ISO 527
Dart impact	n.d.	J/mm	ISO 7765

#Range measured on sheet test specimens (0,3-0,5mm & 20°C). Properties depend on processing & humidity. MD=machine or extrusion direction. CD=cross or expansion direction.



Version 01 / Date 07-07-2013

## NOTE

For general processing information, please refer to our processing guideline. Our technical services department is available to discuss your requirements and advise on the best grade selection for products & (color) masterbatches.



FIGURE 1  
From reclaimed potato starch to Solanyl<sup>®</sup>.



FIGURE 2  
Typical product examples made with Solanyl<sup>®</sup> extrusion grades.

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Parameter*	Guide value	Unit	Test method
<b>Mechanical properties</b>			
E-modulus	1,7-2,0	GPa	ISO 527
Secants modulus	0,8-1,2	GPa	ISO 527
Tensile stress	>24	MPa	ISO 527
Strain at yield	5-6	%	ISO 527
Strain at break	>30	%	IDO 527
Flexural stress	>30 (DNB)	MPa	ISO 178
Flexural modulus	>1,7	GPa	ISO 178
Impact Unnotched	>50	kJ/m <sup>2</sup>	ISO 179/ 1eU (Charpy)
Impact Notched	>4	kJ/m <sup>2</sup>	ISO 179/ 1eA (Charpy)
Impact Unnotched	n.d.	kJ/m <sup>2</sup>	ISO 180/ 1eU (Izod)
Impact Notched	n.d.	kJ/m <sup>2</sup>	ISO 180/ 1eA (Izod)
Hardness	n.d.	Shore D	ISO 868

\*Injection molded test specimens. DNB = did not break. Properties f (processing & humidity).

Parameter*	Guide value	Unit	Test method
<b>Other properties</b>			
Viscosity	10-100-1000 /sec	Pa.sec	ISO 11433
at T= 160 °C	n.d.		
at T= 170 °C	n.d.		
MFI <sup>^</sup> (170°C, 2,16 kg)	2-4	g/10 min	indicative
MFI <sup>^</sup> (190°C, 5 kg)	n.d.	g/10 min	ISO 1133
MVR <sup>^</sup> (190°C, 2,16 kg)	n.d.	cm <sup>3</sup> /10min	ISO 1133
Spiral flow (170-190°C)	15-30	cm	1,9 mm (25°C mold)
Vicat A	55-60	°C	ISO 306
HDT-A/B	55-60	°C	ISO 75
T melt (peak)	155-158	°C	DSC (in-house ISO 11357)
T glass	60-62	°C	DSC (in-house ISO 11357)
Flammability	n.d.	mm/min	UL 94 rating HB
WVTR (75%RH, 23°C)	n.d.	g/m <sup>2</sup> /d	ISO 15106
WVTR (90%RH, 38°C)	b.d.	g/m <sup>2</sup> /d	ISO 15106
OTR (50%RH, 23°C)	n.d.	cc/ m <sup>2</sup> /d	ISO 15105-2
CO <sub>2</sub> TR (0%RH, 23°C)	n.d.	cc/ m <sup>2</sup> /d	ISO 15105-1

<sup>^</sup> MFI/MVR is measured above processing T only using pressure & can therefore not directly be compared with MFI values obtained for polyolefins.

NOTE

Figures and data are intended as a guide and should not be used in preparing end specifications. The properties given must be regarded for guidance purposes only, since product is based on renewable raw materials with fluctuating properties by nature. Consequently the material has to be processed in accordance with our guidelines.

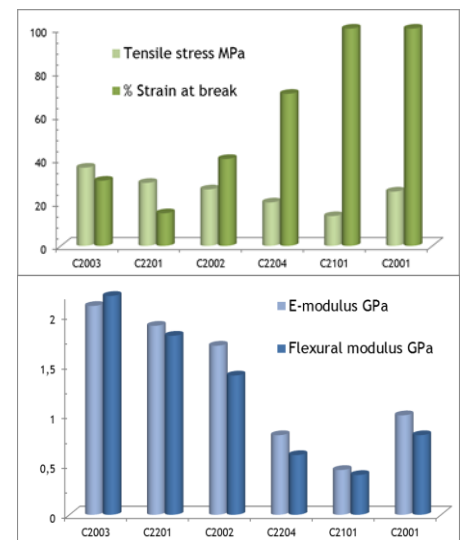


FIGURE 3

A comparison of mechanical properties of Solanyl<sup>®</sup> C2 grades.

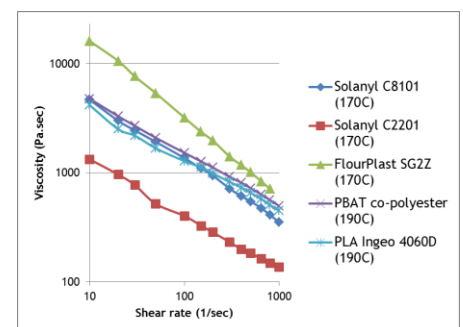


FIGURE 4

Viscosity profile of Solanyl<sup>®</sup> C grades compared with some other bioplastics. Please note that more grades with a variety of properties are available as well.

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# Solanyl<sup>®</sup> C2002

Solanyl<sup>®</sup> C2002 is developed for extrusion Sheet or profile applications.

Solanyl<sup>®</sup> C2002 is a sustainable alternative for oil based plastics.

## GENERAL CHARACTERISTICS

Solanyl<sup>®</sup> C2002 is standard delivered at <1,1% water. Properties may depend on water content, humidity, processing and thickness. Properties are given as guide values.

Parameter*	Guide value	Unit	Test method
Appearance	Yellowish pearls	-	Visual
Bulk density	700-800	kg/m <sup>3</sup>	ISO 60
Density	1,25-1,3	g/cm <sup>3</sup>	ISO 1183
Mold shrinkage	<2%	%	ISO 294-4
Moisture content	<0,6	%	Rodenburg directive (ISO 287)
Water activity	<0,3	-	Rodenburg directive (ISO/TC 34)
Ash content	<2	%	Rodenburg directive (ISO 3451)

## PROCESSING

Solanyl<sup>®</sup> C2002 can be processed on most standard extrusion machines, preferably with a low shear screw design and low temperature settings. Solanyl<sup>®</sup> C2002 results in a non-transparent off-white product with a natural soft feel. Prospective clients should evaluate Solanyl<sup>®</sup> C2002 in their own laboratories to establish optimal conditions for use in their processes and applications. Solanyl<sup>®</sup> C2002 can be colored with biodegradable masterbatches. Processing and product properties can be enhanced using masterbatches such as impact modifiers.

For general processing information, please refer to our processing guideline. Our technical services department is available to discuss your requirements and advise on selection of color masterbatches.

## NOTE

This information is believed to be accurate & refers to the laws, regulations & products at the date of issue. However, Rodenburg Biopolymers makes no express or implied representations or warranties with respect to the information contained herein. It is the responsibility of our customers to determine that their use of products is safe, lawful, & technically suitable for their applications. Because of possible changes in the laws & regulations, we cannot guarantee that the status of the products will remain unchanged.

## MATERIAL SAFETY DATA SHEETS

Material Safety Data Sheets (MSDS) for are available for all grades of resin products which Rodenburg Biopolymers produces. Material Safety Data Sheets are provided to help customers satisfy their own handling, safety and disposal needs, and those that may be required by locally applicable health and safety regulations, such as OSHA (U.S.A), MAK (Germany), or WHMIS (Canada).

## CHEMICAL CONTROL LAW COMPLIANCE

Across the globe regulations exist for local environmental authorities to evaluate materials to assure the protection of human health and the environment from any unreasonable risks associated with chemical substances. Components used in Rodenburg Biopolymers' resins as supplied from the factory gate comply with the European Union (EINECS)/REACH chemical inventory.

## ADDITIONAL INFORMATION

Solanyl<sup>®</sup> C2002 contains still some moisture. This moisture is the result of manufacturing process. Solanyl<sup>®</sup> C2002 can be processed without further drying before most standard applications or uses. However degassing can improve properties and also predrying can affect processing and properties positively depending on converting technique.

If Solanyl<sup>®</sup> C2002 is used in applications, other than those mentioned, the choice, processing and use of Solanyl<sup>®</sup> C2002 is the sole responsibility of the purchaser. All legal and other regulations must be complied with.

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## REMARKS & OTHER INFORMATION

Presuming appropriate processing, the composition of product Solanyl<sup>®</sup> C2002 complies with EC Plastics Regulation 10/2011 and as such has potential to be used in the EC countries for materials or articles according to article 3 of Regulation EC No 1935/2004 on materials and articles intended to come into contact with food and repealing Directives 80/590/EEC & 89/109/EEC and FDA food contact standards codes of federal regulations CFR 21. Compliance with the provisions of these regulations, especially the suitability of the articles for the given application, the effect on smell and taste of the food, and observance of any given limitations, must be ensured by the person who introduces the articles into circulation. The specific restrictions mentioned in EC Plastics Regulation No 10/2011 and amendments have to be ensured. Migration should be measured on finished articles placed into contact with the foodstuff or appropriate food simulants for a period and at a temperature which are chosen by reference to the contact conditions in actual use.

## CERTIFICATION

Solanyl<sup>®</sup> C2002 complies with EN13432 (industrial composting) Vinçotte OK Compost. Solanyl<sup>®</sup> C2002 can be fermented (giving methane gas) in a High Solids Anaerobic biodegradation test (HSAD) under thermophilic conditions (52°C ± 2°C) with a relative biodegradation of over 60% (51 days) (ISO 15985 - ASTM D.5511).

Solanyl<sup>®</sup> C2002 complies with certification according to Vinçotte OK Biobased class 3 star and certification is pending.

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## TRANSPORT, STORAGE AND SHELF LIFE

Solanyl<sup>®</sup> C2002 must be stored in a cool dry place, out of direct sunlight and protected against humidity. Product should be maintained in closed bag and processed within several hours after opening. Storage time should not exceed 1 year after date of production of the granulate.

## PACKAGING

Packaging; 25 kg paper bags, big bags, super sacks or octabins. Identification: Grade name, Lot nr. and production location.



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Rodenburg Biopolymers is a trade name of RB Biobased Institute B.V.