NaturePlast
Bioplastics Expert

BIOPLASTICS MATERIALS PORTFOLIO

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SUMMARY

RAW MATERIALS

Biodegradable range

- ✓ PLA: Poly(lactides)
- ✓ PHAs: Poly(hydroxy alcanoates)
- ✓ Biopolyesters

Biobased range

- ✓ Biobased PA
- ✓ Biobased Elastomers
- ✓ Cellulose Esters

BIOPLASTICS COMPOUNDS Ranges

- ✓ NP SOFT
- ✓ NP RIGID
- ✓ NP HIGH TEMPERATURE
- ✓ NP HIGH FLUIDITY
- ✓ NP LIFE TIME
- ✓ NP WATER SOLUBLE
- ✓ NP WATER TREATEMENT
- ✓ NP ACTIVE COMPONENT

FIBERS AND COPRODUCTS BIOCOMPOSITES Ranges

- ✓ Cereals: NPW CER
- ✓ Sea: NPW SEA
- ✓ Shells & Nuts: NPW SHE
- ✓ Fruits: NPW VEG
- ✓ Natural Fibers: NPW FIB
- ✓ Textiles: NPW TEX

Non-exhaustive list, contact us for more information.

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RAW MATERIALS

PLA

General properties

PLA is a thermoplastic polyester produced using annually renewable biomass like corn, sugar beet, or sugarcane.
Depending on the geographical area of production, the resources used may be certified GMO free.

Applications

Process:

- Injection moulding and blowing
- Thermoforming
- Flat extrusion die or cast
- Extrusion of profiles

Markets:

- Rigid packaging: containers, trays, bottles
- Flexible packaging: film
- Regular consumption goods
- Non-woven or textile fibre

Properties

- 100% biobased
- Biodegradable and industrially compostable
- Rigid and brittle
- Transparent
- Food safe

	GRADE	PROPERTIES	DENSITY	MFI (g/10 min; 190 °C/2,16 kg)	TENSILE MODULUS (MPa)	TENSILE ELONGATION (%)	CHARPY IMPACT unnotched (kJ/m²)	THERMAL RESISTANCE (°C; HDT B)
	ISO Method		*1183*	*1133*	*527*	*527*	*179*	*75-2*
Extrusion	**PLE 005**	PLLA	1,25	7	3 500	5	23	51
	PLE 005-A	Amorphous	1,24	3	3 500	5	23	51
	PLE 005-1	High viscosity	1,25	1	3 500	5	23	51
Injection	**PLI 005**	PLLA	1,25	25 – 35	3 500	4	22	53

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PHAs

General properties

PHAs are thermoplastic polyesters produced using annually renewable biomass like maize or different sugars obtained from agricultural activities. In time, ongoing developments in industrialisation will allow producing these polymers from waste material or by-products from various industries.

Applications

Process:

- Primarily injection moulding
- Thermoforming

Markets:

- Horticulture / agriculture
- Rigid packaging: containers, pots, boxes
- Regular consumption goods
- Fishkeeping / fish farming

Properties

- 100% biobased
- Biodegradable in different environments and industrially compostable
- Rigid
- Opaque
- Food safe

GRADE	PROPERTIES	DENSITY	MFI (g/10 min; 190 °C/2,16 kg)	TENSILE MODULUS (MPa)	TENSILE ELONGATION (%)	CHARPY IMPACT unnotched (kJ/m²)	THERMAL RESISTANCE (°C; HDT B)
ISO Method		*1183*	*1133*	*527*	*527*	*179*	*75-2*
Injection							
PHI 001	Additivated	1,25	15	860	/	45	45
PHI 002	Raw	1,25	15 - 30	4200	4	5	134
Compounding							
PHI 003	Powder	1,24	15 - 30	4200	4	5	134

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Biopolyesters

General properties

Biopolyesters are a range of biodegradable and compostable thermoplastic polyesters which can be partially produced using annually renewable biomass like sugarcane. They will be 100% biobased in a few years

Applications

Process:

- Extrusion: blown film, blow-molding, profiles
- Injection molding
- Thermoforming

Markets:

- Flexible packaging: film, bag manufacturing
- Rigid packaging: containers, pots, boxes
- Regular consumption goods
- Horticulture / agriculture: mulching film

Properties

- Up to 50% biobased
- Biodegradable in different environments and industrially compostable
- Flexible
- Translucent
- Food safe

GRADE	BIOBASED %	DENSITY	MFI (g/10 min; 190 °C/2,16 kg)	TENSILE MODULUS (MPa)	TENSILE ELONGATION (%)	CHARPY IMPACT unnotched (kJ/m²)	THERMAL RESISTANCE (°C; HDT B)
ISO Method		*1183*	*1133*	*527*	*527*	*179*	*75-2*
Extrusion							
PBE 001	35%	1,24	5	290	>590	No Break	/
PBE 003	50%	1,26	5	720	330	No Break	90 (HDT B)
PBE 006	0%	1,26	4-6	85	>590	No Break	80 (Vicat A)
PBE 111	0%	1,26	1,5	660	700	No Break	97 (HDT B)
Injection							
PBI 003	50%	1,26	20	730	330	No Break	83 (HDT B)

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Biobased PA

General properties

Biobased PAs are a range of Polyamides produced using annually renewable biomass like vegetable oils. These materials have excellent mechanical and chemical resistance.

Applications

Process:

- Primarily injection moulding
- Extrusion

Markets:

- Technical parts
- Regular consumption goods
- Transport
- Sports and leisure

Properties

- Up to 100% biobased
- Non biodegradable
- Flexible to rigid
- Translucent to opaque
- Food safe

	GRADE	BIOBASED CARBON %	DENSITY	VISCOSITY INDEX (cm^3/g)	TENSILE MODULUS (MPa)	ELONGATION AT BREAK (%)	CHARPY IMPACT unnotched (kJ/m^2)	THERMAL RESISTANCE (°C)
	ISO Method	*ASTM D 6866*	*1183*	*307*	*527*	*527*	*179*	*75-2 ou 306*
Injection	**NP BioPA610-201**	63	1,06	160	2100	>50	No Break	196 (Vicat B)
	NP BioPA1010-201	100	1,05	160	1700	>50	No Break	171 (Vicat B)
	NP BioPA11-251	100	1,03	/	1280	>200	No Break	/
	NP BioPA11-252	50	1,01	/	1622	>140	No Break	135 (HDT B)

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Biobased Elastomers

General properties

Biobased elastomers are a range of biodegradable thermoplastic resins partially produced using annually renewable biomass. This range consists of materials like **BioTPU** and **BioTPE**.

Applications

Process:

- Primarly injection moulding

Markets:

- Sports and leisure
- Transports
- Regular consumption goods

Properties

- Up to 80% biobased
- Some of them are biodegradables through industrial composting
- Highly flexible
- Abrasion resistance
- Some of them are fit for food contact

GRADE	NATURE	BIOBASED	BIODEGRADABLE	FOOD CONTACT	HARDNESS	TRANSPARENCY
Injection						
NP EL 209 range	TPE	20 to 75 %	No	Possible	50 Sh A to 55 Sh D	Translucent
NP EL 210 range	TPU	32 to 42 %	No	Possible	82 to 95 Sh A	Yes
NP EL 211 range	TPU	40 to 60 %	No	No	67 to 84 Sh A	Yes

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Cellulose esters

General properties

Cellulose esters are thermoplastic resins partially produced using biomass like wood.

Applications

Procédés :

- Injection molding
- Plate extrusion
- Thermoforming

Marchés :

- Cosmetic / luxury
- Appearance parts

Properties

- Up to 63% biobased
- Non biodegradable
- Rigid
- Transparent

GRADE	PROPERTIES	DENSITY	PLASTICIZER CONTENT (%)	FLEXURAL MODULUS (MPa)	ELONGATION AT BREAK (%)	IZOD notched IMPACT (kJ/m²)	THERMAL RESISTANCE (°C ; HDT A)
ASTM Method		*D792*					
Injection							
ACI 002	Cellulose acetate	1,27	29	1931	30	203	68

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BIOPLASTICS COMPOUNDS

NP SOFT Range

General properties

The NP Soft range consists of a set of biobased and biodegradable polyester-based compounds. They present improved flexibility and elongation at break properties.

Applications

Process:

- Blow film extrusion
- Injection

Markets:

- Primary and secondary flexible packaging
- Regular consumption goods
- Sports and leisure

Properties

- Partially biobased
- Biodegradable and compostable
- Food safe
- Flexible
- Translucent depending on the product

GRADE	MATRIX	MFI (g/10 min; 190 °C/2,16 kg)	TENSILE MODULUS (MPa)	FLEXURAL MODULUS (MPa)	ELONGATION AT BREAK (%)	CHARPY IMPACT unnotched (kJ/m²)
ISO Method		*1133*	*527*	*178*	*527*	*179*
Extrusion						
NP SF 141	PLA	/	1200	690	420	110
Injection						
NP SF 231	Biopolyester	35,8	195	167	>600	No Break
NP SF 232	Biopolyester	6,3	1600	1500	60	163
NP SF 241	PLA	11,4	1565	/	80	No Break

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NP RIGID Range

General properties

The **NP Rigid** range consists of a set of **biobased and biodegradable polyester-based compounds**.
They present improved rigidity properties.
Several other versions are available depending on the performance levels to be attained, please contact us for more information

Applications

Process:

- Primarily injection moulding

Markets :

- Primary and secondary rigid packaging
- Technical parts
- Sports and leisur

Properties

- Partially to completely biobased
- Biodegradable and compostable
- Food safe
- Rigid
- Translucent depending on the product

GRADE	MATRIX	MFI (g/10 min; 190 °C/2,16 kg)	TENSILE MODULUS (MPa)	FLEXURAL MODULUS (MPa)	ELONGATION AT BREAK (%)	CHARPY IMPACT unnotched (kJ/m²)
ISO Method		*1133*	*527*	*178*	*527*	*179*
Injection						
NP RG 241	PLA	9	5483	4902	3,2	14,2
NP RG 251	PHA	44	5371	/	2,4	7

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NP HIGH TEMPERATURE RANGE

General properties

The **NP High Temperature** range consists of a set of PLA based compounds. These compounds were specifically developed to improve the thermal resistance of PLA.

Applications

Process:

- Extrusion
- Injection

Markets:

- Primary and secondary rigid packaging
- Disposable tableware
- Technical parts
- Consumption goods

Properties

- High biosourced material content (> 80%)
- Biodegradable and compostable
- Food safe
- Excellent temperature behaviour

GRADE	MATRIX	MFI (g/10 min; 190 °C/2,16 kg)	TENSILE MODULUS (MPa)	TEMPERATURE RESISTANCE (°C ; HDT B)	ELONGATION AT BREAK (%)	CHARPY IMPACT unnotched (kJ/m²)
ISO Method		*1133*	*527*	*79*	*527*	*179*
Extrusion						
NP HT 101	PLA	5	3498	130	13,7	33,5
Injection						
NP HT 201	PLA	50 - 60	3600	127	17,2	85
NP HT 202	PLA	40	2400	118	31,8	121
NP HT 203	PLA	20	3600	127	17,2	85

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NP HIGH FLUIDITY RANGE

General properties

The **NP High Fluidity** range consists of a set of Biopolyesters based compounds. These compounds were specifically developed to improve the fluidity of biopolyesters.

Applications

Process:

- Mostly injection

Markets:

- Primary and secondary rigid packaging
- Disposable tableware
- Technical parts
- Consumption goods

Properties

- High biosourced material content (> 80%)
- Biodegradable and compostable
- Food safe
- Excellent fluidity

GRADE	MATRIX	MFI (g/10 min; 190 °C/2,16 kg)	TENSILE MODULUS (MPa)	TEMPERATURE RESISTANCE (°C ; HDT B)	ELONGATION AT BREAK (%)	CHARPY IMPACT unnotched (kJ/m²)
ISO Method		*1133*	*527*	*79*	*527*	*179*
Injection						
NP HF 201	PLA	87	3000	42	6.1	17

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NP LIFE TIME Range

General properties

The **NP Life Time** range consists of a set of biobased and biodegradable polyester-based compounds. The products in this range were specifically designed to accelerate or reduce the rate of biodegradation of the products.

Applications

Process:

- Primarily injection

Markets:

- Agriculture / horticulture
- Consumption goods

Properties

- Partially to completely biosourced
- Biodegradable and compostable
- Accelerated or slowed degradation depending on the product

GRADE	MATRIX	PROPERTIES	TENSILE MODULUS (MPa)	FLEXURAL MODULUS (MPa)	ELONGATION AT BREAK (%)	CHARPY IMPACT unnotched (kJ/m²)
ISO Method			*527*	*178*	*527*	*179*
Injection						
NP LT 241	PLA	Slowed degradation	3937	/	5,4	23,1
NP LT 251	PHA	Accelerated degradation	2931	2335	3	7,1

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NP WATER SOLUBLE Range

General properties

The **NP Water Soluble** range consists of a set of biobased and biodegradable polyester-based compounds. The products in this range were specifically designed to ensure solubility or quick biodegradability in an aqueous environment.

Applications

Process:

- Extrusion
- Injection

Markets:

- Agriculture / horticulture
- Consumption goods

Properties

- Partially biobased
- Biodegradable and compostable
- Accelerated degradation in aqueous environmen

GRADE	MATRIX	MFI (g/10 min; 190°C / 2,16 kg)	TENSILE MODULUS (MPa)	ELONGATION AT BREAK (%)	STRENGTH AT BREAK (MPa)
ISO Method		*1133*	*527*	*527*	*527*
Extrusion					
NP WS 131	Biopolyester	0,8	1255	7,5	36,7
Injection					
NP WS 231	Biopolyester	9,1	517	50	23,7

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NP WATER TREATEMENT
Range

General properties

The **NP Water Treatement** range consists of a set of polymer-based compounds which are biodegradable in an aqueous environment. These products allow regulating the quality of water, and may also constitute a source of nutrition in aqueous environments.

Applications

Process:

- Extrusion
- Injection

Markets:

- Consumption goods in aqueous environment

Properties

- Biobased
- Biodegradable and compostable

This range has no standard reference, each development being carried out according to the specifications submitted.
Please contact us for any inquiries on this subject.

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NP ACTIVE COMPONENT Range

General properties

The **NP Active Component** range consists of a set of polymer-based compounds of standard or biodegradable plastic type. These compounds integrate the active components which provide new functionalities to the finished product: attractant, repellent, or nutritive properties, etc.

Applications

Process:

- Extrusion
- Injection

Markets:

- Consumption goods
- Agriculture / horticulture

Properties

- Biosourced depending on product
- Biodegradable and compostable depending on the product
- Salting-out the active elements during use or biodegradation

This range has no standard reference, each development being carried out according to the specifications submitted.
Please contact us for any inquiries on this subject.

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FIBRE AND BY-PRODUCT BIOCOMPOSITES

NPW CER Range

General properties

The **NPW CER** range consists of a set of Biocomposites which can be produced from oilbased as well as biobased or biodegradable polymers.
The by-products used here as fillers are waste material from cereal processing activities.

Applications

Process:

- Primarily injection moulding
- Adaptable to other processes

Markets:

- Rigid secondary packaging
- Regular consumption goods
- Technical parts
- Agriculture / horticulture
- Cosmetic / luxury

Properties

- Partially to totally biobased
- Some of them are biodegradable and compostable
- Rigid
- Natural appearance

GRADE	MATRIX	FILLER	FILLING RATE (%)	MFI (g/10 min ; 190°C/2,16 kg)	TENSILE MODULUS (MPa)	ELONGATION AT BREAK (%)	CHARPY IMPACT unnotched (kJ/m²)
ISO Method				*1133*	*527*	*527*	*179*
Injection							
NPW CER 210	PP	Wheat	20	2,8	1550	8,7	19,8
NPW CER 220	Biobased PE	Wheat	15	/	1300	20,4	19,2
NPW CER 221	Biobased PE	Wheat	30	/	1430	15,5	12,8
NPW CER 230	Biopolyester	Wheat	15	7,1	1000	11,9	22,3
NPW CER 231	Biopolyester	Wheat	30	21	1300	6,6	10

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NPW SEA Range

General properties

The **NPW SEA** range consists of a set of Biocomposites which can be produced from oilbased as well as biobased or biodegradable polymers.
The by-products used here as fillers are waste material from seashell.

Applications

Process:

- Primarily injection moulding
- Adaptable to other processes

Markets:

- Rigid secondary packaging
- Regular consumption goods
- Technical parts
- Agriculture / horticulture
- Cosmetic / luxury

Properties

- Partially to totally biobased
- Some of them are biodegradable and compostable
- Rigid
- Natural appearance

GRADE	MATRIX	FILLER	FILLING RATE (%)	MFI (g/10 min ; 190°C/2,16 kg)	TENSILE MODULUS (MPa)	ELONGATION AT BREAK (%)	CHARPY IMPACT unnotched (kJ/m²)
ISO Method				*1133*	*527*	*527*	*179*
Injection							
NPW SEA 210	PP	Oyster	30	-	3140	7,1	14
NPW SEA 211	PP	Fine oyster	30	-	1400	11,4	19
NPW SEA 212	PP	Scallop	30	-	1550	9,6	7,6
NPW SEA 213	PP	Scallop	20	8	1400	21	23,1
NPW SEA 214	PP	Algae	30	9	2250	5,7	12,8
NPW SEA 220	BioPE	Algae	30	6	1 760	11.3	15
NPW SEA 230	Biopolyester	Oyster	30	27	1690	7,9	32
NPW SEA 231	Biopolyester	Algae	30	17	1 340	7,9	25.1
NPW SEA 240	PLA	Algae	20	26	5 540	3.4	7.3

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NPW SHE Range

General properties

The **NPW SHE** range consists of a set of Biocomposites which can be produced from oilbased as well as biobased or biodegradable polymers.
The by-products used here as fillers are waste material from shells or kernels from different sources.

Applications

Process:

- Primarily injection moulding
- Adaptable to other processes

Markets:

- Rigid secondary packaging
- Regular consumption goods
- Technical parts
- Agriculture / horticulture
- Cosmetic / luxury

Properties

- Partially to totally biobased
- Some of them are biodegradable and compostable
- Rigid
- Natural appearance

GRADE	MATRIX	FILLER	FILLING RATE (%)	MFI (g/10 min ; 190°C/2,16 kg)	TENSILE MODULUS (MPa)	ELONGATION AT BREAK (%)	CHARPY IMPACT unnotched (kJ/m²)
ISO Method				*1133*	*527*	*527*	*179*
Injection							
NPW SHE 220	Biobased PE	Hazelnut shel	30	14,3	2770	6,7	7
NPW SHE 230	Biopolyester	Olive stone	20	23,1	1270	11,3	18,5
NPW SHE 231	Biopolyester	Rice husk	30	17,3	1670	5	12,7
NPW SHE 232	Biopolyester	Almond shells	30	23,6	1380	4,5	8,4

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NPW VEG Range

General properties

The **NPW VEG** range consists of a set of Biocomposites which can be produced from oilbased as well as biobased or biodegradable polymers.
The by-products used here as fillers are waste material from agro-food industries (fruit and vegetables).

Applications

Process:

- Primarily injection moulding
- Adaptable to other processes

Markets:

- Rigid secondary packaging
- Regular consumption goods
- Technical parts
- Agriculture / horticulture
- Cosmetic / luxury

Properties

- Partially to totally biobased
- Some of them are biodegradable and compostable
- Rigid
- Natural appearance

GRADE	MATRIX	FILLER	FILLING RATE (%)	MFI (g/10 min ; 190°C/2,16 kg)	TENSILE MODULUS (MPa)	ELONGATION AT BREAK (%)	CHARPY IMPACT unnotched (kJ/m²)
ISO Method				*1133*	*527*	*527*	*179*
Injection							
NPW VEG 220	Biobased PE	Cocoa shell	30	9,8	1360	5,4	8,2
NPW VEG 221	Biobased PE	Coffee grounds	30	5,4	1260	10,8	11,3
NPW VEG 222	Biobased PE	Apple pomace	15	5,5	1460	13,3	19,6
NPW VEG 223	Biobased PE	Grape seeds	30	13,2	960	9,7	10,4

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NPW FIB Range

General properties

The **NPW FIB** range consists of a set of Biocomposites which can be produced from oilbased as well as biobased or biodegradable polymers.
The by-products used here as fillers are natural fibres obtained from various sectors.

Applications

Process:

- Primarily injection moulding
- Adaptable to other processes

Markets:

- Rigid secondary packaging
- Regular consumption goods
- Technical parts
- Agriculture / horticulture
- Cosmetic / luxury

Properties

- Partially to totally biobased
- Some of them are biodegradable and compostable
- Rigid
- Natural appearance

GRADE	MATRIX	FILLER	FILLING RATE (%)	MFI (g/10 min ; 190°C/2,16 kg)	TENSILE MODULUS (MPa)	ELONGATION AT BREAK (%)	CHARPY IMPACT unnotched (kJ/m²)
ISO Method				*1133*	*527*	*527*	*179*
Injection							
NPW FIB 220	Biobased PE	Miscanthus	30	2,3	3340	5,1	8,4
NPW FIB 221	Biobased PE	Flax	30	2,7	2420	7	11,6
NPW FIB 222	Biobased PE	Hemp	30	0,2	2780	5,6	11,6
NPW FIB 230	Biopolyester	Wood	10	33	1250	8,6	23,7
NPW FIB 231	Biopolyester	Miscanthus	30	15	1519	7,5	20,2
NPW FIB 232	Biopolyester	Cork	20	1	60	10,6	16,3
NPW FIB 240	PLA	Cork	20	1	2400	2,7	6,4

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Gamme NPW TEX

General properties

The **NPW TEX** range consists of a set of Biocomposites which can be produced from oilbased as well as biobased or biodegradable polymers.
The by-products used here as fillers are waste material from textile industries.

Applications

Process:

- Primarily injection moulding
- Adaptable to other processes

Markets:

- Secondary packaging
- Regular consumption goods
- Technical parts
- Agriculture / horticulture
- Cosmetic / luxury

Properties

- Partially to totally biobased
- Some of them are biodegradable and compostable
- Softness
- Natural appearance

GRADE	MATRIX	FILLER	FILLING RATE (%)	MFI (g/10 min ; 190°C/2,16 kg)	TENSILE MODULUS (MPa)	ELONGATION AT BREAK (%)	CHARPY IMPACT unnotched (kJ/m²)	SHORE HARDNESS
ISO Method				*1133*	*527*	*527*	*179*	*868*
Injection								
NPW TEX 220	Biobased PE	Leather	30	1,2	1280	26,3	95	60 D
NPW TEX 250	Biobased TPU	Leather	30	3,1	55	>600	No Break	33 D

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