NUREL
ENGINEERING POLYMERS

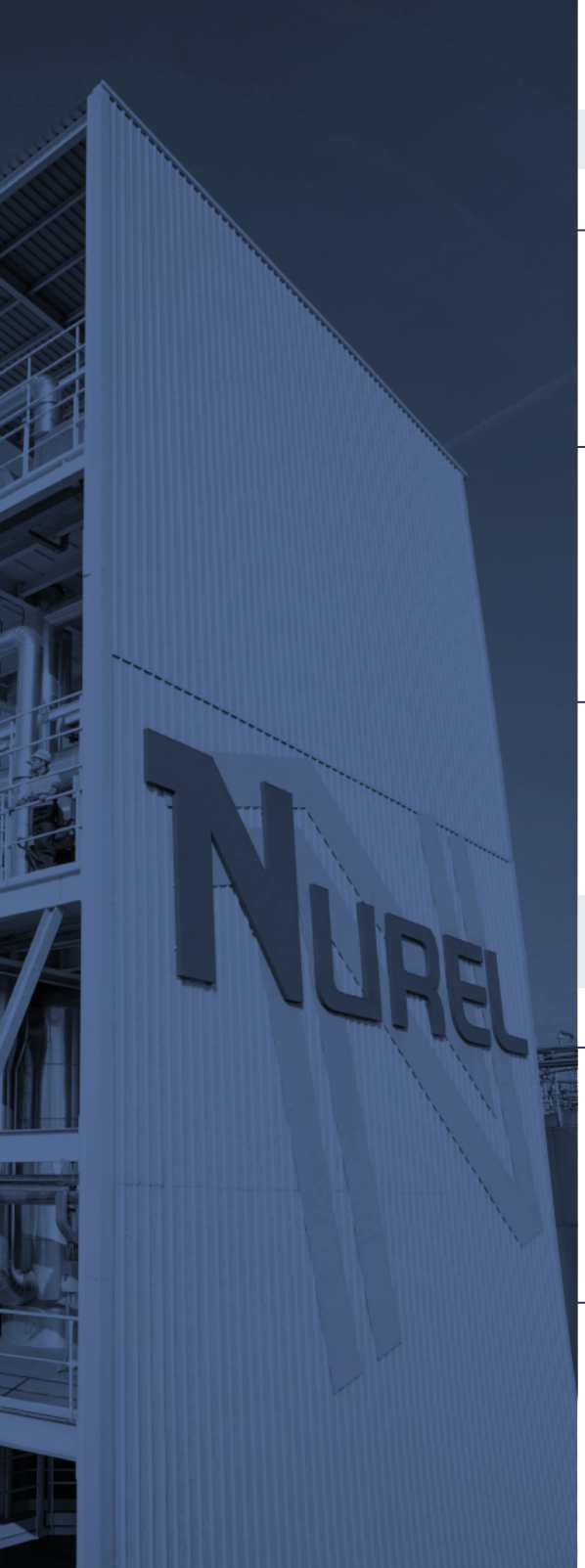
# ENGINEERING POLYMERS

## FOR TECHNICAL 3D PRINTING

Promyde®
POLYAMIDE 6 & 66

Proxylene®
PBT & PET COMPOUNDS

Sinzea®
BIOPOLYMERS




## NUREL ENGINEERING POLYMERS

**NUREL** has established itself as a leader in **advanced** and **technical polymer production**. With over 50 years of expertise in polymerization and compounding, NUREL is dedicated to innovating **technical polymers and biopolymers**, with a strong focus on **environmental responsibility**.

With an annual production capacity of **49,000 tons** of technical compounds, NUREL provides **high-value, advanced solutions** across multiple applications. Among this production, NUREL offers a **specialized range of polymers** tailored specifically for **3D printing**, designed to meet the unique demands of this field with **superior layer adhesion** and **low moisture absorption**.

NUREL's 3D printing polymers offer a high degree of **mechanical properties**, **dimensional stability**, **and ease of processing**, making them ideal for complex, technical 3D printing applications in a variety of industries.

## TECNHICAL POLYMERS FOR 3D PRINTING FILAMENTS

3D printing is an established technology that can **replace the traditional production methods** for a wide range of industrial products. Demand for these products is growing, along with the need to develop **high-value technical solutions**. For this reason, NUREL has developed a comprehensive range of technical materials specifically for **3D printing applications**.

Advanced **3D printing** offers a cost-effective production method, suitable not only for small-scale manufacturing but also for large-scale industrial production. **Polyamides**, **PETG**, **PLA**, and **biopolymers** are essential for producing high-performance parts in FDM processes.

# PRODUCT RANGE

NUREL provides an extensive range of polymers for **3D printing filament extrusion**, offering diverse options to meet the most specialized and challenging applications.

This product line includes **PA compounds**, **PET-G**, **PLA**, along with **biopolymers** and **water-soluble biopolymers**.

3D PRINTING TECHNICAL COMPOUNDS

3D PRINTING BIOPOLYMERS

3D PRINTING REINFORCED COMPOUNDS

3D PRINTING WATER-SOLUBLE BIOPOLYMERS

Promyde® POLYAMIDE 6 & 66

Our **Promyde® copolyamide grades** for 3D printing are engineered with **high mechanical strength**, temperature resistance, low moisture absorption, and exceptional **layer adhesion** compared to standard polyamides.

Proxylene® PBT, PET & PBT-PET

**Proxylene® PET-G** stands out for its **exceptional bed and layer adhesion**, minimizing warpage and ensuring **high-quality printing**, which makes it ideal for producing **durable parts and prototypes**. With superior **toughness**, **impact resistance**, and **flexibility**, components can endure high stress without breaking.

**Proxylene® PLA** compounds are appreciated for their **ease of use** and **biodegradability**, making them an eco-friendly choice. Ideal for **detailed, high-resolution prints**, they offer excellent bed and layer adhesion. Proxylene PLA is well-suited for projects with **low thermal requirements**, providing an efficient and sustainable solution.

Inzea® BIOPOLYMERS

**Inzea® biopolymer**-based printed parts offer improved **adhesion**, **flexibility**, **impact resistance** and, for HTS grades, enhanced thermal resistance.

**Inzea® water-soluble biopolymers** dissolve easily in **cold water** and are commonly used as support materials in 3D printing. They leave no residue on the final product, ensuring a clean finish and simplifying post-processing.

# POLYAMIDES FOR 3D PRINTING

NUREL has developed **PA6-based copolyamides** specifically for 3D printing applications. These materials combine the exceptional **mechanical properties** of PA6 with optimal **printing conditions** and superior **processability**.

Our **copolyamides** have been engineered to adjust **crystallinity** and reduce the **melting point** to below 220°C, simplifying the printing process and enhancing part quality.

**Promyde® copolymides** provide improved **layer adhesion** and enables printing without a heated bed, while also reducing **moisture absorption**, **warping**, and **shrinkage** typical of standard standard PA6.

| | | | NEAT PA | PA CF REINFORCED | PA GF REINFORCED |
|---|---|---|---|---|---|
| **PHYSICAL PROPERTIES** | **TEST METHOD** | **UNIT** | **B730** | **B930 P2 CF15S** | **B930 P2 G30 S2** |
| **Density** | ISO 1183 | g/cm³ | 1,15 | 1,18 | 1,34 |
| **Moisture absorption** | ISO 62 | % | 3,00 | 2,50 | 2,00 |
| **Reinforcement content** | | % | 0 | 15 | 30 |
| **PROCESSING CONDITIONS** | | | | | |
| **Melt temperature** | - | °C | 210-260 | 220-280 | 220-280 |
| **Mould Shrinkage** | | % | 0,20 | 0,80 | 0,50 |
| | - | % | 0,10 | 0,70 | 0,40 |
| **MECHANICAL PROPERTIES** | | | **DRY / CONDITIONED*** | | |
| **Tensile modulus** | ISO 527-1/-2 | MPa | 2.900 / 1.500 | 9.000 / - | 5.500 / - |
| **Tensile strength** | ISO 527-1/-2 | MPa | 50 / 30 | 120 / - | 80 / - |
| **Elongation at break** | ISO 527-1/-2 | % | 2 / 20 | 4 / - | > 3 / - |
| **Flexural modulus** | ISO 178 | MPa | 2.800 / 1.300 | 8.000 / - | 4.500 / - |
| **Flexural strength** | ISO 178 | MPa | 112 / 60 | 180 / - | 125 / - |
| **Charpy unnotched impact strength (1)** | ISO 179/1eU | kJ/m² | 140 / NB | 60 / - | 25 / - |
| **Charpy notched impact strength** | ISO 179/1eA | kJ/m² | 7.0 / 40 | 4.0 / - | 4.0 / - |
| **THERMAL PROPERTIES** | | | | | |
| **Melting temperature (DSC)** | ISO 3146 | °C | 185 | 210 | 210 |
| **HDT (0,45 MPa)** | ISO 75-1/-2 | °C | 80 | 160 | 160 |

(1) NB: No break. | * dry = dry as moulded / cond. = conditioned according to ISO 1110

# POLYAMIDES PRODUCT RANGE

## NEAT POLYAMIDES

**PROMYDE B730**
UNREINFORCED

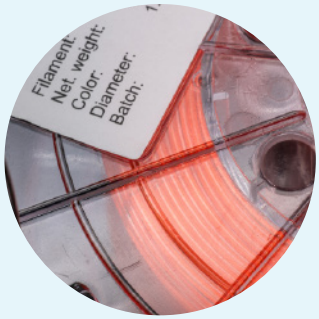
## GLASS AND CARBON REINFORCED POLYAMIDES

**PROMYDE B930 P2 G30 S2**
GF REINFORCED

**PROMYDE B930 P2 CF15S**
CF REINFORCED

# PET-G FOR 3D PRINTING

Proxylene®
PBT, PET & PBT-PET




**PET-G** is a popular 3D printing material due to its **versatility**, **strong adhesion**, and minimal **warping**, ensuring high-quality results.

**Proxylene®** PET-G combines the **strength** and **durability** of ABS with the **ease of use** of PLA, making it ideal for **functional parts** and **prototypes**. Its toughness and **impact resistance**, along with good **flexibility**, reduce the likelihood of printed parts breaking under stress.

With a higher **glass transition temperature** of around **80°C**, PET-G can withstand higher temperatures without deforming. This makes it a suitable choice for applications requiring exposure to elevated temperatures.

| | | | UNREINFORCED PET-G | PET-G CF REINFORCED | | PET-G GF REINFORCED |
|---|---|---|---|---|---|---|
| **PHYSICAL PROPERTIES** | **TEST METHOD** | **UNIT** | **A95G** | **A95G P2 CF10S** | **A95G P2 CF15S** | **A95G P2 G30 S2** |
| **Density** | ISO 1183 | g/cm³ | 1,27 | 1,30 | 1,33 | 1,45 |
| **Moisture absorption** | ISO 62 | % | 0,2 | 0,2 | 0,2 | 0,1 |
| **Reinforcement content** | | % | 0 | 10 | 15 | 30 |
| **PROCESSING CONDITIONS** | | | | | | |
| **Melt temperature** | | ºC | 220-260 | 220-260 | 220-260 | 220-260 |
| **Mould Shrinkage** | | % | 0,5 | 0,4 | 0,4 | 0,3 |
| | | % | 0,5 | 0,4 | 0,4 | 0,3 |
| **MECHANICAL PROPERTIES** | | | | | | |
| **Tensile modulus** | ISO 527-1/-2 | MPa | 2.200 | 6.000 | 7.500 | 5.000 |
| **Tensile strength** | ISO 527-1/-2 | MPa | 50 | 75 | 80 | 60 |
| **Elongation at break** | ISO 527-1/-2 | % | > 50 | > 5 | 5 | > 3 |
| **Flexural modulus** | ISO 178 | MPa | 1.900 | 5.000 | 6.500 | 4.800 |
| **Flexural strength** | ISO 178 | MPa | 65 | 100 | 115 | 80 |
| **Charpy unnotched impact strength (1)** | ISO 179/1eU | kJ/m² | NB | > 50 | 55 | > 25 |
| **Charpy notched impact strength** | ISO 179/1eA | kJ/m² | 10 | > 5 | 5 | 5 |
| **THERMAL PROPERTIES** | | | | | | |
| **Glass Transition Temperature (Tg)** | | ºC | 78 | 78 | 78 | 78 |
| **Melting temperature (DSC)** | ISO 3146 | ºC | - | - | - | - |
| **HDT (0,45 MPa)** | ISO 75-1/-2 | ºC | 60 | 80 | 80 | 80 |

(1) NB: No break.

# PET-G PRODUCT RANGE

## NEAT PET-G

**PROXYLENE A95G**
UNREINFORCED

## GLASS AND CARBON REINFORCED PET-G

**PROXYLENE A95G P2 CF10S**
**A95G P2 CF15S**
CF REINFORCED

**PROXYLENE A95G P2 G30 S2**
CF REINFORCED

# PLA FOR 3D PRINTING

**Proxylene® PLA** Proxylene PLA with up to **15% carbon fiber reinforcement** is an ideal choice for 3D printing due to its **rigidity, strength**, and **dimensional stability**. This material is perfect for lightweight, durable parts with high-resolution prints and strong bed and layer adhesion.

The carbon fiber reinforcement makes **Proxylene PLA CF** well-suited for **functional prototypes**, **end-use parts**, and **automotive components** that need mechanical strength and low weight. With its reduced environmental impact and low shrinkage, it's an excellent choice for **sustainable** projects requiring precision and performance.

| | | | 10% CARBON FIBER PLA | 15% CARBON FIBER PLA |
|---|---|---|---|---|
| **PHYSICAL PROPERTIES** | **TEST METHOD** | **UNIT** | **X5 P2 CF10S** | **X5 P2 CF15S** |
| **Density** | ISO 1183 | g/cm³ | 1,28 | 1,34 |
| **Reinforcement content** | | % | 10 | 15 |
| **Melt Volume Rate (MVR)** | | | 3 | 3 |
| **PROCESSING CONDITIONS** | | | | |
| **Melt temperature** | | °C | 190 - 220 | 190 - 220 |
| **MECHANICAL PROPERTIES** | | | | |
| **Tensile modulus** | ISO 527-1/-2 | MPa | 7.000 | 8.000 |
| **Tensile strength** | ISO 527-1/-2 | MPa | 75 | 80 |
| **Elongation at break** | ISO 527-1/-2 | % | 3 | 2 |
| **Flexural modulus** | ISO 178 | MPa | 6.500 | 7.500 |
| **Flexural strength** | ISO 178 | MPa | 115 | 120 |
| **Charpy unnotched impact strength (1)** | ISO 179/1eU | kJ/m² | 4 | 3 |
| **Charpy notched impact strength** | ISO 179/1eA | kJ/m² | 20 | 20 |
| **THERMAL PROPERTIES** | | | | |
| **Glass Transition Temperature (Tg)** | | °C | 60 | 60 |
| **Melting temperature (DSC)** | ISO 3146 | °C | 160 | 160 |
| **HDT (0,45 MPa)** | ISO 75-1/-2 | °C | 60 | 60 |

(1) NB: No break.

# PLA PRODUCT RANGE

## **CARBON** REINFORCED PLA

**PROXYLENE**
**X5 P2 CF10S**
10% CF REINFORCED

**PROXYLENE**
**X5 P2 CF15S**
15% CF REINFORCED

# BIOPOLYMERS FOR 3D PRINTING

## COMPOSTABLE BIOPOLYMERS

**NUREL's INZEA® biopolymers** for **3D filament** provide a **bio-based, compostable,** and **biodegradable** solution ideal for a variety of 3D printing applications.

Parts printed with INZEA® biopolymers offer significant **mechanical advantages over PLA**, including improved **adhesion**, **flexibility**, **impact resistance**, and, for HTS grades, **higher thermal resistance**.

## WATER-SOLUBLE BIOPOLYMERS

**Water-soluble INZEA® biopolymers** are designed for dissolving in water and serve as **supports** for **complex structures**.
It **dissolves easily in cold water**, leaving the final object without residue.

| | | | BIODEGRADABLE | | | WATER-SOLUBLE |
|---|---|---|---|---|---|---|
| **PHYSICAL PROPERTIES** | **TEST METHOD** | **UNIT** | **INZEA F58** | **INZEA F2 HTS 451** | **INZEA F2 HTS 090** | **INZEA FWS10** |
| **Density** | ISO 1183-1 | g/cm³ | 1,25 | 1,32 | 1,62 | 1,34 |
| **Melt Volume Rate** | ISO 1133 | cc/10min | 14 | 20 | <20 | 10 - 15 |
| **Melting Temperature (DSC)** | ISO 3146 | °C | 110-120 | 175-180 | 175-180 | 150-170 |
| **MECHANICAL PROPERTIES** | | | | | | |
| **Tensile modulus** | ISO 527-1/-2 | MPa | 420 | 2800 | 7800 | 7.000 |
| **Tensile strength** | ISO 527-1/-2 | MPa | 35 | 44 | 50 | 45 |
| **Elongation at break** | ISO 527-1/-2 | % | 400 | 8 | 2 | 3 |
| **Flexural modulus** | ISO 178 | Mpa | 475 | 2650 | 8500 | 6.000 |
| **Flexural strength** | ISO 178 | MPa | 20 | 70 | 90 | 70 |
| **Charpy unnotched impact strength** | ISO 179/1eA | kJ/m² | 18 | 5 | 3 | 3 |
| **Heat Deflection Temperature (HDT)** | ISO 75-1/-2 | °C | 80 | 80 | 90 | 15 |

# BIOPOLYMERS PRODUCT RANGE

## BIODEGRADABLE

**INZEA F58**
FLEXIBLE
HEAT RESISTANCE

**F2 HTS 451**
VERSATILE
HEAT RESISTANCE

**F2 HTS 090**
STRONG
HEAT RESISTANCE

## WATER-SOLUBLE

**INZEA FWS10**
BIODEGRADABLE
WATER-SOLUBLE

NUREL
ENGINEERING POLYMERS

Ctra. Barcelona km 329
50016 Zaragoza Spain
Tel.: +34 976 465 579
**polymers.nurel**.com

Promyde® POLYAMIDE 6 & 66

Proxylene® PBT & PET COMPOUNDS

Inzea® BIOPOLYMERS