



## Ultrafuse<sup>®</sup> rPET

recycled | fatigue resistant | strong

## Extended TDS

Complete Technical Documentation and  
Testing Summary

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# Technical Data Sheet

## 3D printing filament made from recycled PET post industrial wast.

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Please contact us for further product information, like for example REACH, RoHS, FCS.

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Process materials in a well-ventilated room, or use professional extraction systems

Filament Properties		
Filament Diameter	1.75 mm	2.85 mm
Average diameter Tolerance	±0.050 mm	±0.1 mm
Average ovality	<0.050 mm	<0.050 mm
Available Spool size	750 g	750 g
Available colors	Light blue	

Spool Properties				
Spool size	750 g	2.0 kg	4.0 kg	8.0 kg
Outer diameter	200 mm	300 mm	350 mm	355 mm
Inner diameter	50.5 mm	51.5 mm	51.7 mm	36 mm
Width	55 mm	103 mm	103 mm	167 mm

Recommended 3D-Print processing parameters		Used for test specimens
Printer	FFF printer	Ultimaker 3
Nozzle Temperature <sup>1)</sup>	225 – 245 °C	235 °C
Build Chamber Temperature	-	With cover
Bed Temperature	65 – 85 °C	75 °C
Bed Material	Glass + adhesive spray	Glass + adhesive spray
Nozzle Diameter	≥ 0.4 mm	0.4 mm
Print Speed	30 - 60 mm/s	40 mm/s
Max Volumetric Speed <sup>2)</sup>	12 mm <sup>3</sup> /s	//

Please check your standard and/or high speed print profile availability for an easy start at

<sup>1</sup> Fast printing might require an additional increase of the nozzle temperature; the stated printing speed of 300 mm/s is based on current validations. As equipment and technology continues to evolve, it is possible that even higher printing speeds may be attainable in the future.

<sup>2</sup> Based on Bambu Lab X1C with a nozzle diameter of XX mm

[www.forward-am.com](http://www.forward-am.com).

#### Further Recommendations

Drying recommendations to ensure printability and best mechanical properties<sup>3)</sup> 60 °C in a hot air dryer or vacuum oven for at least 8 to 10 hours.

Support material compatibility

Single material breakaway, Ultrafuse® BVOH

General Properties	Standard	Average Values
Filament Density <sup>4)</sup>	ISO 1183-1	1287 kg/m <sup>3</sup>

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<sup>3)</sup> Please note: To ensure constant material properties the material should always be kept dry.

<sup>4)</sup> measured on filament

Tensile Properties <sup>5)</sup>	Standard	Average Values		
		XY-Direction <sup>6)</sup>	XZ-Direction <sup>7)</sup>	ZX-Direction <sup>8)</sup>
Tensile strength <sup>9)</sup>	ISO 527	38.6 MPa	-	14.7 MPa
Elongation at Break <sup>9)</sup>	ISO 527	4.3 %	-	1.2 %
Young's Modulus <sup>10)</sup>	ISO 527	1640 MPa	-	1334 MPa

Flexural Properties <sup>6) 11)</sup>	Standard	Average Values		
		XY-Direction	XZ-Direction	ZX-Direction
Flexural Strength	ISO 178	66.9 MPa	65.4 MPa	30.2 MPa
Flexural Modulus	ISO 178	1662 MPa	1551 MPa	829 MPa
Flexural Elongation at Break	ISO 178	5.5 %	4.8%	3.0%

Impact Properties <sup>6)</sup>	Standard	Average Values		
		XY-Direction	XZ-Direction	ZX-Direction
Impact Strength Charpy (notched)	ISO 179-2	4.0 kJ/m <sup>2</sup>	2.0 kJ/m <sup>2</sup>	1.0 kJ/m <sup>2</sup>
Impact Strength Charpy (unnotched)	ISO 179-2	55.5 kJ/m <sup>2</sup>	33.7 kJ/m <sup>2</sup>	3.3 kJ/m <sup>2</sup>
Impact Strength Izod (notched)	ISO 180	4.4 kJ/m <sup>2</sup>	3.3 kJ/m <sup>2</sup>	1.5 kJ/m <sup>2</sup>

<sup>5)</sup> Samples were conditioned in standard climate (23°C, 50% RH 72h)



<sup>9)</sup> Testing speed: 5 / 200 mm/min

<sup>10)</sup> Testing speed: 1 mm/min

<sup>11)</sup> Testing speed: 2 mm/min

Measured on milled specimens

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Impact Strength Izod (unnotched)	ISO 180	48.2 kJ/m <sup>2</sup>	21.9 kJ/m <sup>2</sup>	4.4 kJ/m <sup>2</sup>
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For the diagrams on mechanical properties see Chapter: [Mechanical Properties Diagrams](#)

Thermal Properties <sup>6)</sup>	Standard	Average Values
HDT A at 1.8 MPa	ISO 75-2	69 °C
HDT B at 0.45 MPa	ISO 75-2	73 °C
Vicat softening point at 50 N	ISO 306	75 °C
Vicat softening point at 10 N	ISO 306	80 °C
Glass Transition Temperature	ISO 11357-2	83 °C
Melt Volume-Flow Rate (MVR)	ISO 1133	15.1 cm <sup>3</sup> /10 min (220 °C, 5 kg)

For the diagrams on thermal properties see Chapter: [Thermal Properties Diagrams](#).

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Hardness and Abrasion	Standard	Typical Values
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Shore Hardness D (15s)	DIN ISO 7619-1	69
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Certification	Standard
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Food Contact Certification (FCC)	The used raw materials comply with food contact regulations of the European Parliament	EC 2023/2006
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For the statement on Biocompatibility data see Chapter [Biocompatibility](#).

For the statement on FCC data see Chapter [Food Contact Certification](#).

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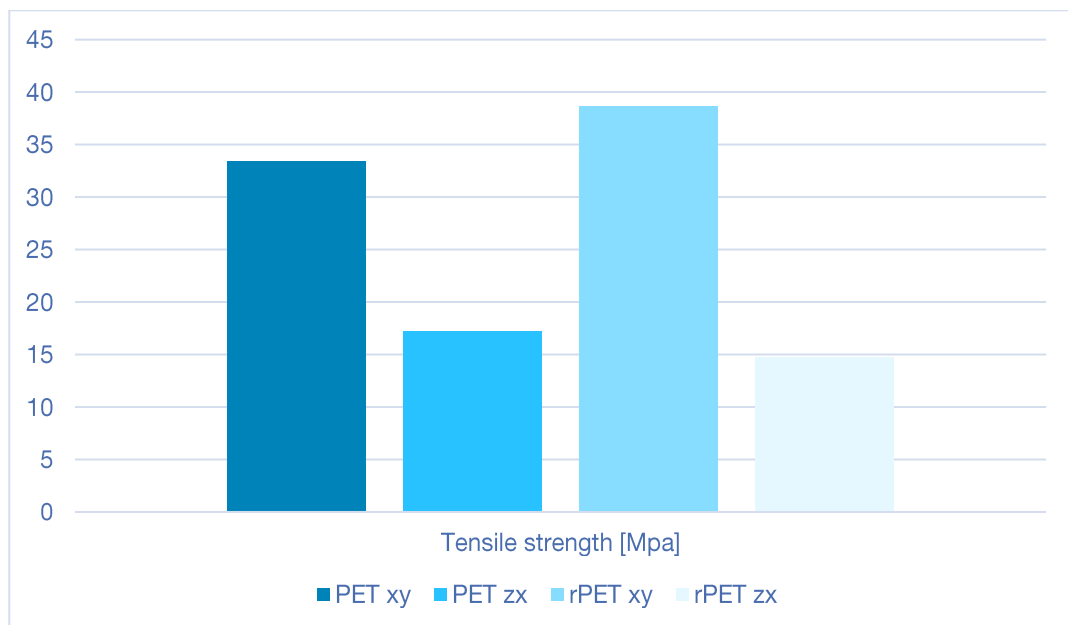
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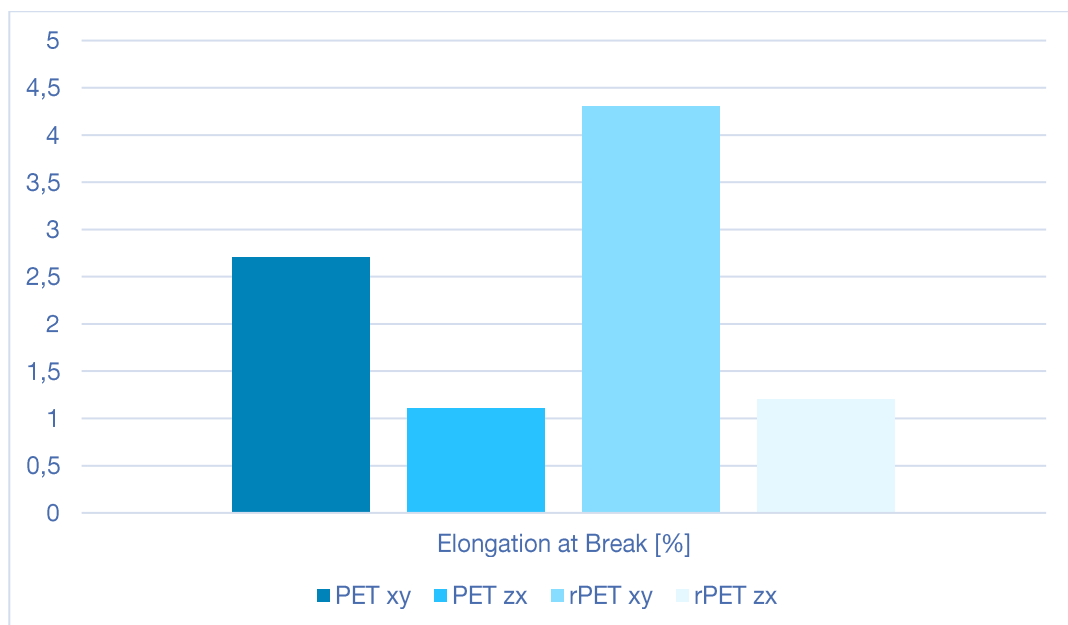
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# Mechanical Properties Diagrams

## Comparison Ultrafuse® PET and Ultrafuse® rPET

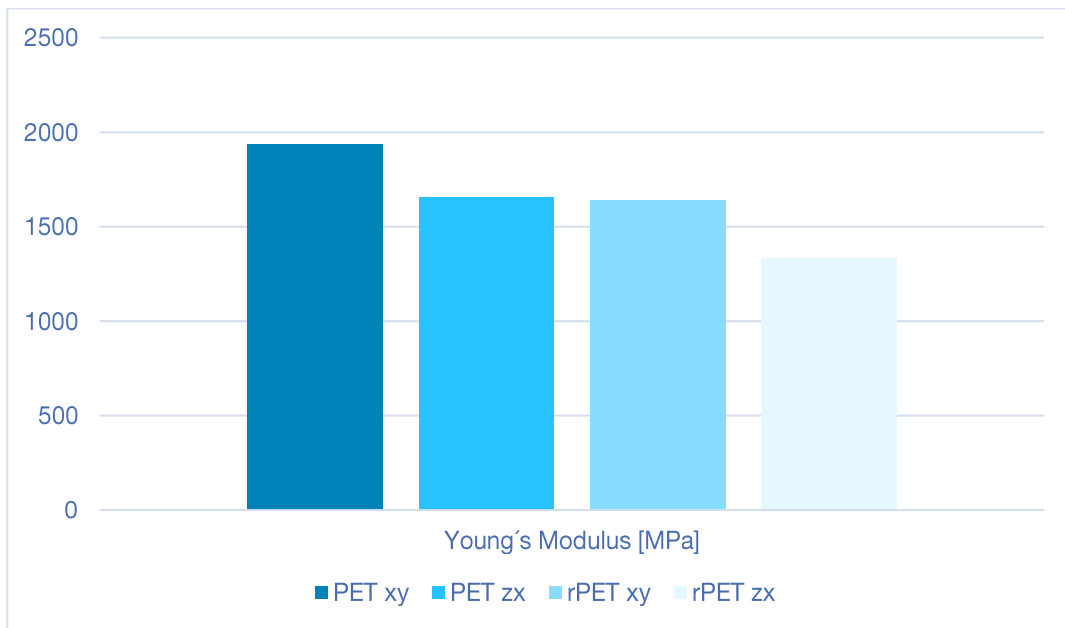


*Tensile strength comparison Ultrafuse® PET and Ultrafuse® rPET*

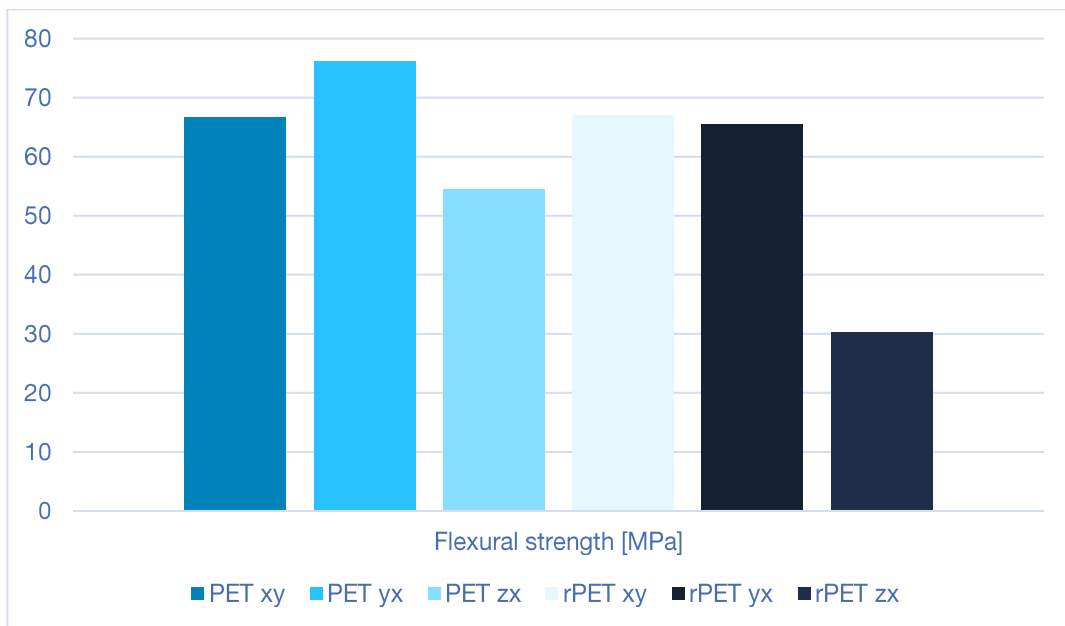


*Elongation at Break comparison Ultrafuse® PET and Ultrafuse® rPET*

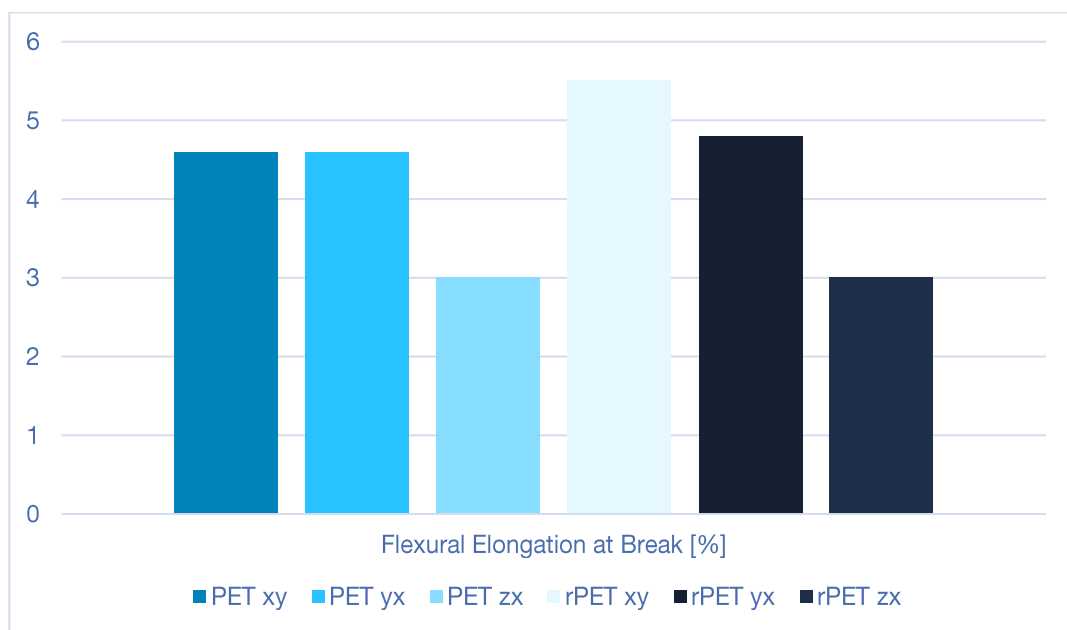




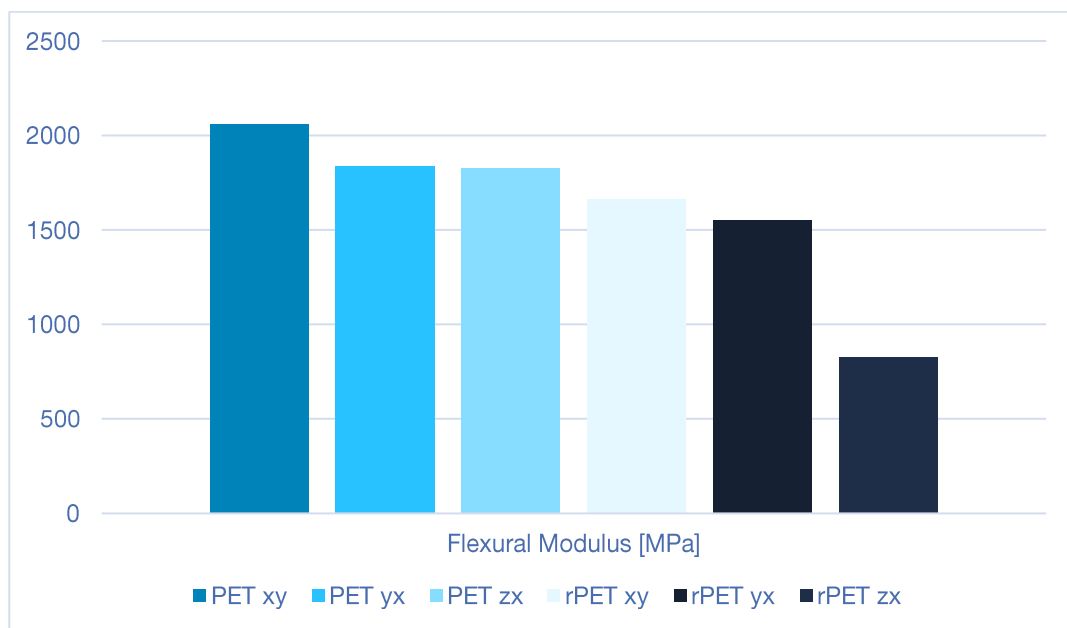
*Young's modulus comparison Ultrafuse® PET and Ultrafuse® rPET*



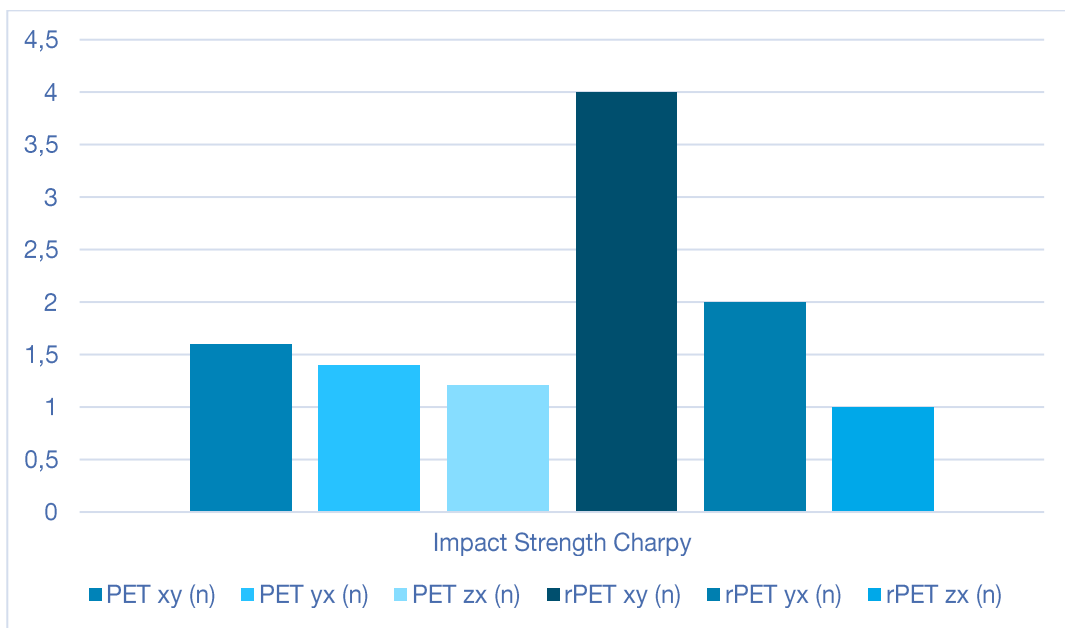
*Flexural strength comparison Ultrafuse® PET and Ultrafuse® rPET*



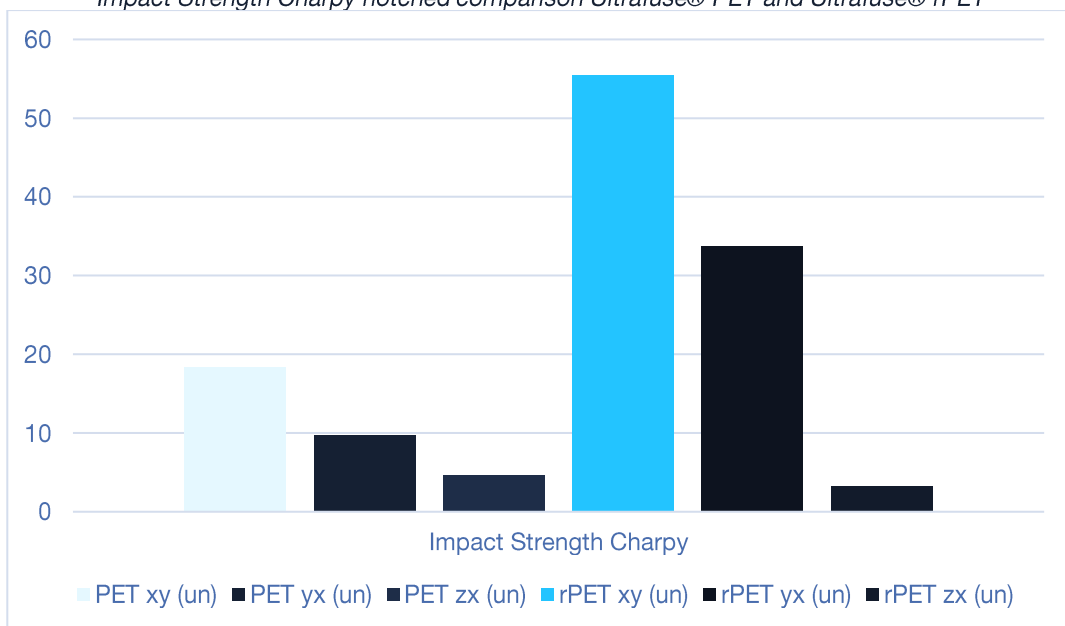
*Flexural Elongation at Break comparison Ultrafuse® PET and Ultrafuse® rPET*



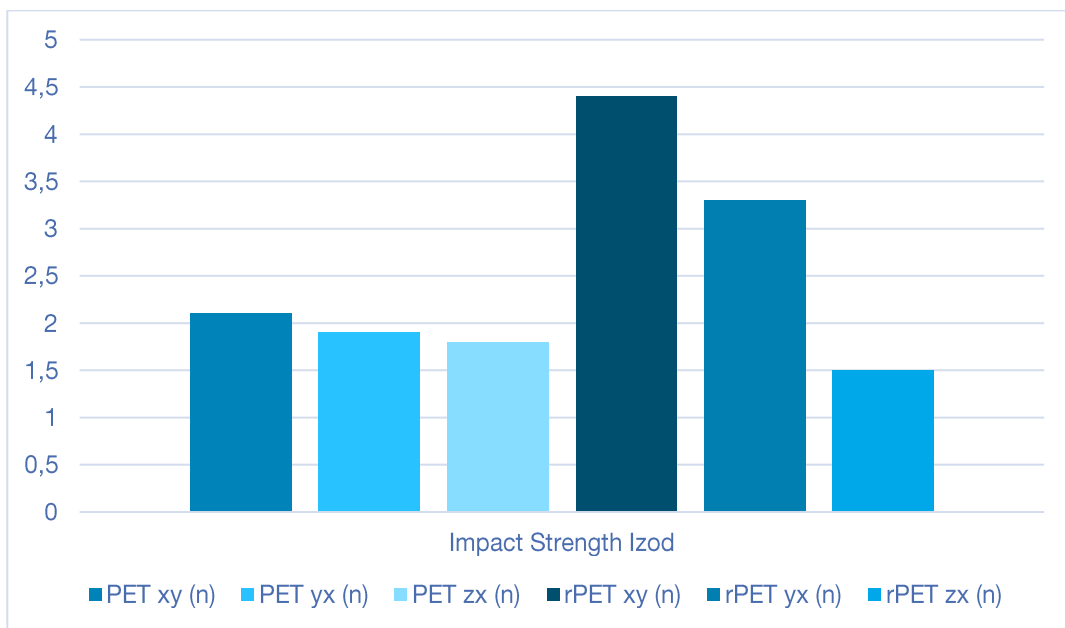
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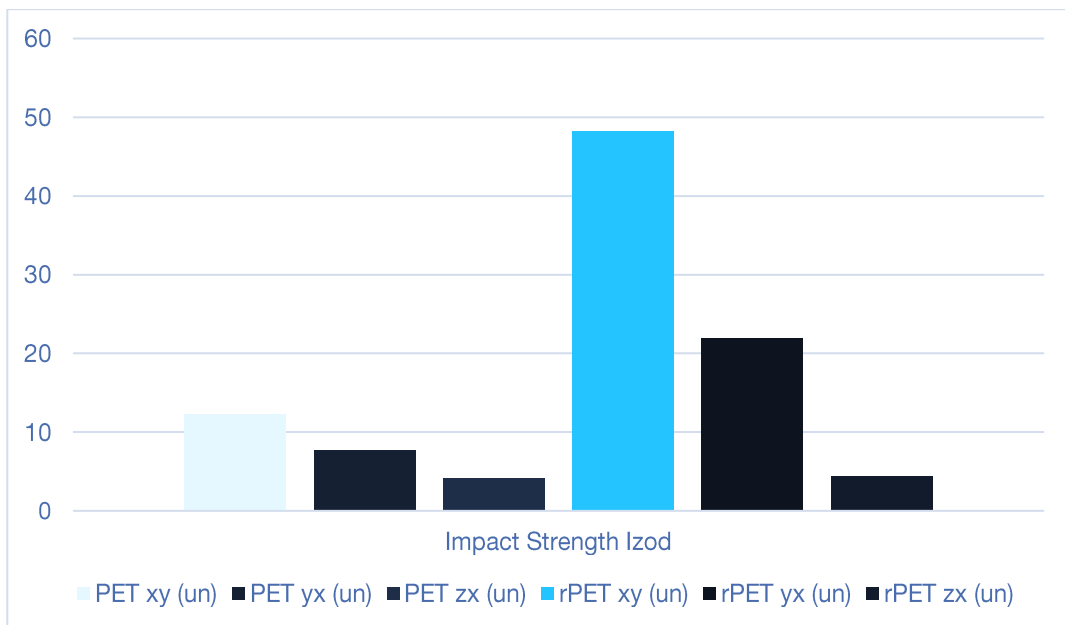
Impact Strength Charpy notched comparison Ultrafuse® PET and Ultrafuse® rPET



Impact Strength Charpy unnotched comparison Ultrafuse® PET and Ultrafuse® rPET



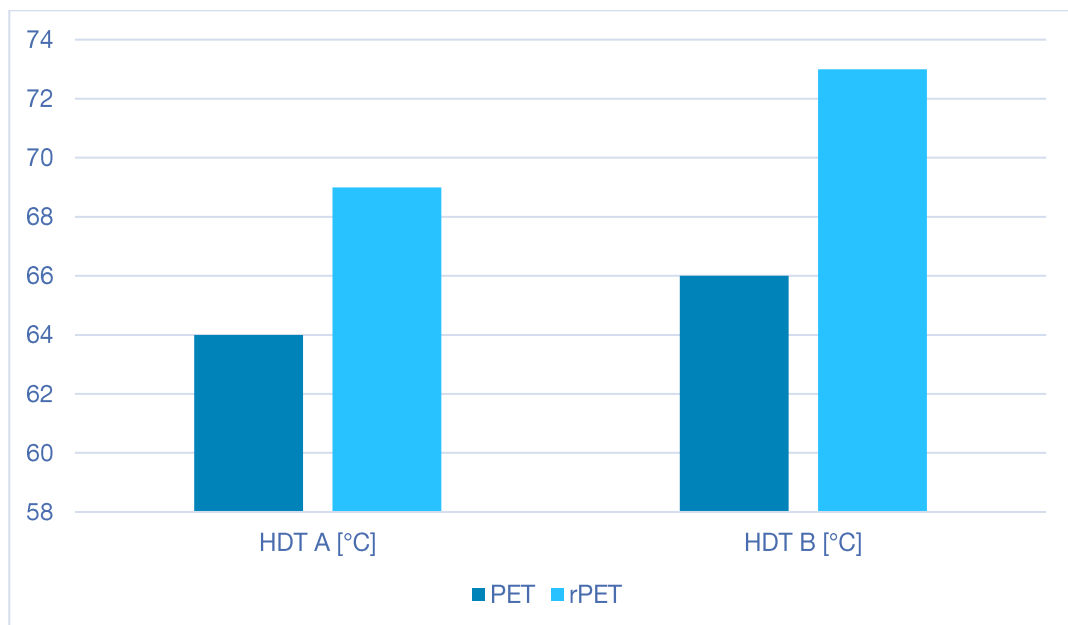
Impact Strength Izod notched comparison Ultrafuse® PET and Ultrafuse® rPET



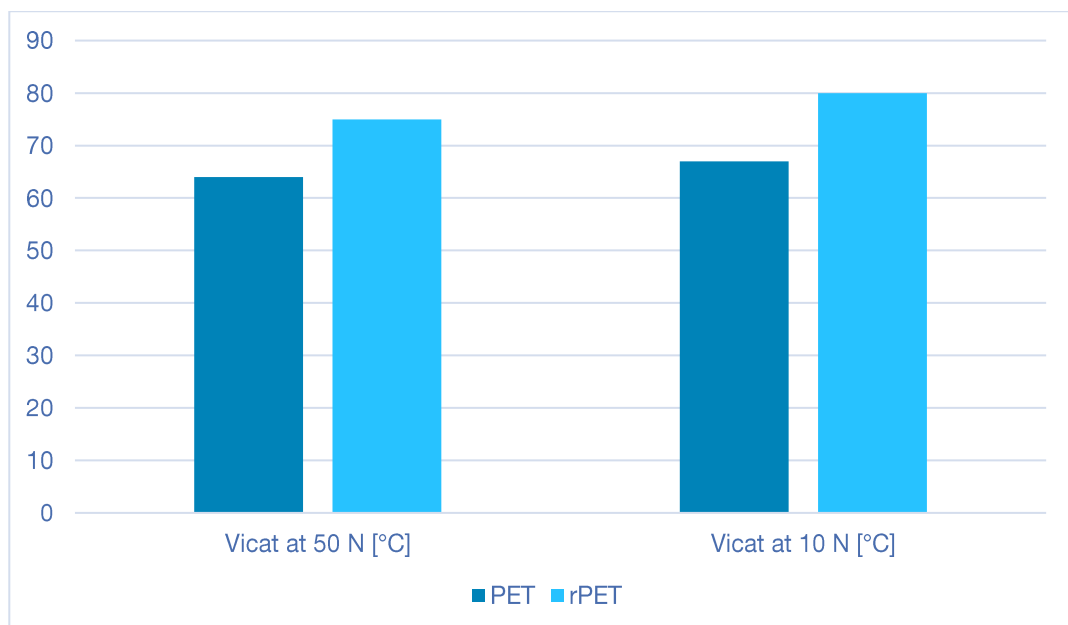
Impact Strength Izod unnotched comparison Ultrafuse® PET and Ultrafuse® rPET

## Thermal Properties Diagrams

### Comparison Ultrafuse® PET and Ultrafuse® rPET



*HDT comparison Ultrafuse® PET and Ultrafuse® rPET*



*Vicat comparison Ultrafuse® PET and Ultrafuse® rPET*

# Food Contact Certification



## Food Contact Certificate

## Ultrafuse rPET

Date: July 26th, 2024

Version no.: 1.0

Dear customer,

We can confirm that our raw material suppliers certified that Ultrafuse rPET can be used to manufacture (Food Grade) thermoformed packaging. The temperature range for processing the materials is the same temperature as used for regular virgin PET-G. During production no additives other than materials that are in full compliance with the Regulation (EC) No 10/2011 and amendments are being used. The production Process is under control of a quality assurance system as stated in Regulation (EC) No 2023/2006.

Since Forward AM Technologies Netherlands B.V. is not the manufacturer of the final (3D printed) product, the responsibility to test if the final product complies with national and international legislation rests with the user of the filament.

This product information was generated electronically and is valid without signature.

*This document expires upon any regulatory change. Please request new confirmation if needed.*

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

# Recycled Content Declaration



We create chemistry

## ISO 14021 Recycled Content Declaration

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**Product: Ultrafuse® rPET**

Revision: 10/26/2023

Version: 1.1

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[www.forward-am.com](http://www.forward-am.com)

As part of our commitment to environmental responsibility we adhere to ISO 14021. This Recycled Content Declaration Form aims to provide a clear and transparent information about the material composition and recycled content of the Ultrafuse® rPET, as well as the type of recycled material utilized.

Product	Colors	Material Composition	Recycled Material	Recycled Material Type
Ultrafuse® rPET	Natural Blue <sup>1</sup>	100% rPETG	>99% <sup>2</sup>	Pre-consumer <sup>3</sup>

<sup>1</sup>Please note that a slight shift in appearance can occur for this recycled PETG (Ultrafuse® rPET) with a natural blue color. As this product is manufactured out of 99-100% recycled materials, based on our efforts to produce a low product carbon footprint, no substances are added to stabilize the color resulting in the possibility that a shade shift can occur.

<sup>2</sup>Recycled material is material that has been reprocessed from recovered [reclaimed] material by means of a manufacturing process and made into a final product or into a component for incorporation into a product.

<sup>3</sup>Pre-consumer material, is material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it. Pre-consumer is also known as post-industrial.

Recycled and biobased content can vary due to new guidelines, operating conditions, suppliers, and material availability.

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