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Ultrafuse® PA6 GF30

reinforced | stiff | strong

Extended TDS

Complete Technical Documentation and Testing Summary

Version 1.4

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Technical Data Sheet

Glass fiber reinforced filament with extreme stiffness and strength for demanding 3D printing applications.

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	700 g, 2.2 kg	700 g, 2.2 kg
Available colors	black	

Spool Properties					
Spool size	750 g	750 g New Spool	2.0 kg	4.0 kg	8.0 kg
Outer diameter	200 mm	200 mm	300 mm	350 mm	355 mm
Inner diameter	50.5 mm	52 mm	51.5 mm	51.7 mm	36 mm
Width	55 mm	68 mm	103 mm	103 mm	167 mm

Recommended 3D-Print processing parameters		Used for test specimens
Printer	FFF printer	Raise 3D Pro2
Nozzle Temperature[1)]	240 – 280 °C / 464 – 536 °F	250 °C
Build Chamber Temperature	passively heated, closed chamber	-
Bed Temperature	70 – 100 °C / 158 – 212 °F	95 °C
Bed Material	glass	PEI
Nozzle Diameter	≥ 0.6 mm	0.6 mm
Print Speed	30 - 60 mm/s	60 mm/s
Max Volumetric Speed[2)]	15 mm^3/s	//

Please check your standard and/or high speed print profile availability for an easy start at www.forward-am.com.

[1] Fast printing might require an additional increase of the nozzle temperature; the stated printing speed 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.
[2] Based on Bambu Lab X1C with a nozzle diameter of 0.6 mm

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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.

Further Recommendations	
Drying recommendations to ensure printability and best mechanical properties[3]	100 °C in a hot air dryer or vacuum oven for 4 to 16 hours
Support material compatibility	Ultrafuse® BVOH
Warehousing	Ultrafuse® PA6 GF30 filament should be stored at 15 - 25°C in its originally sealed package in a clean and dry environment. If the recommended storage conditions are observed the products will have a minimum shelf life of 12 months.

General Properties	Standard	Average Values
Filament Density[4]	ISO 1183-1	1356 kg/m³

Tensile Properties[5]	Standard	Average Values		
		XY-Direction	XZ-Direction	ZX-Direction
Tensile strength[6] conditioned[7]	ISO 527	46.4 MPa	-	12.2 MPa
Tensile strength[6] dry[8]	ISO 527	78.3 MPa	-	14.9 MPa
Elongation at Break[6] conditioned[7]	ISO 527	3.2 %	-	1.9 %
Elongation at Break[6] dry[8]	ISO 527	2.2 %	-	0.8 %
Young's Modulus[9] conditioned[7]	ISO 527	2469 MPa	-	1156 MPa
Young's Modulus[9] dry[8]	ISO 527	5036 MPa	-	2380 MPa

[3] Please note: To ensure constant material properties the material should always be kept dry.
[4] measured on filament
[5] Samples were conditioned in standard climate (23°C, 50% RH 72h)
[6] Testing speed: 5 mm/min
[7] Samples were conditioned in standard climate (23°C, 50% RH 72h)
[8] Samples were dried at 80°C vacuum until weight constancy
[9] Testing speed: 1 mm/min

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Flexural Properties[6) 10)]	Standard	Average Values		
		XY-Direction	XZ-Direction	ZX-Direction
Flexural Strength conditioned[7)]	ISO 178	80.2MPa	130.0 MPa	29.1 MPa
Flexural Strength dry[8)]	ISO 178	147.4 MPa	188.2 MPa	44.2 MPa
Flexural Modulus conditioned[7)]	ISO 178	2861 MPa	4301 MPa	1070 MPa
Flexural Modulus dry[8)]	ISO 178	4694 MPa	8103 MPa	2371 MPa
Flexural Elongation at Break conditioned[7)]	ISO 178	11.6 %	6.5 %	5.3 %
Flexural Elongation at Break dry[8)]	ISO 178	4.0 %	2.7 %	2.0 %

Impact Properties[6)]	Standard	Average Values		
		XY-Direction	XZ-Direction	ZX-Direction
Impact Strength Charpy (notched) conditioned[7)]	ISO 179-2	17.0 kJ/m²	20.9 kJ/m²	2.7 kJ/m²
Impact Strength Charpy (notched) dry[8)]	ISO 179-2	8.9 kJ/m²	16.2 kJ/m²	-
Impact Strength Charpy (unnotched) conditioned[7)]	ISO 179-2	41.8 kJ/m²	48.8 kJ/m²	3.1 kJ/m²
Impact Strength Charpy (unnotched) dry[8)]	ISO 179-2	38.9 kJ/m²	45.5 kJ/m²	2.2 kJ/m²
Impact Strength Izod (notched) conditioned[7)]	ISO 180	20.9 J/m	19.0 J/m	2.7 J/m
Impact Strength Izod (notched) dry[8)]	ISO 180	9.2 J/m	13.4 J/m	-
Impact Strength Izod (unnotched) conditioned[7)]	ISO 180	36.9 J/m	41.4 J/m	3.8 J/m
Impact Strength Izod (unnotched) dry[8)]	ISO 180	38.4 J/m	28.7 k/m	2.6 J/m

For the diagrams on mechanical properties see Chapter: Mechanical Properties Diagrams

[10] Testing speed: 2 mm/min

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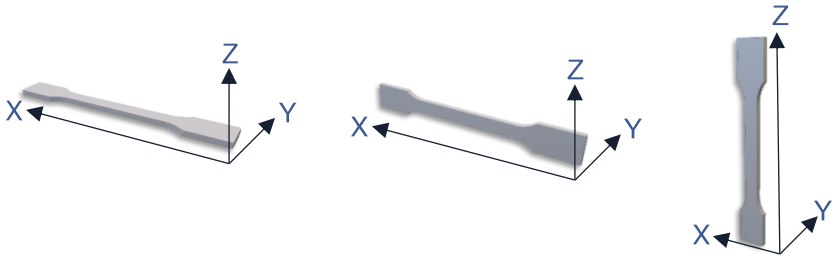
Thermal Properties[6]	Standard	Average Values
HDT A at 1.8 MPa conditioned[7]	ISO 75-2	146 °C
HDT A at 1.8 MPa dry[8]	ISO 75-2	152 °C
HDT B at 0.45 MPa conditioned[7]	ISO 75-2	186 °C
HDT B at 0.45 MPa dry[8]	ISO 75-2	189 °C
Vicat softening point at 50 N conditioned[7]	ISO 306	163 °C
Vicat softening point at 50 N dry[8]	ISO 306	192 °C
Vicat softening point at 10 N conditioned[7]	ISO 306	183 °C
Vicat softening point at 10 N dry[8]	ISO 306	199 °C
Glass Transition Temperature	ISO 11357-2	67 °C
Crystallization Temperature	ISO 11357-3	167 °C
Melting Temperature	ISO 11357-3	209 °C
Melt Volume-Flow Rate (MVR)	ISO 1133	58.3 cm^3/10 min (275°C, 5 kg)

For the diagrams on thermal properties see Chapter: Thermal Properties Diagrams.

Fire, Smoke, Toxicity (FST) properties[6]	Standard	Average Values
Flame class rating	UL 94	HB (1.6 mm) HB (3.1 mm)

Print direction explanation

The orientation of the 3D printed part in the printer is always aligned with the longest axis first. The print direction is consistently along the Z-axis.



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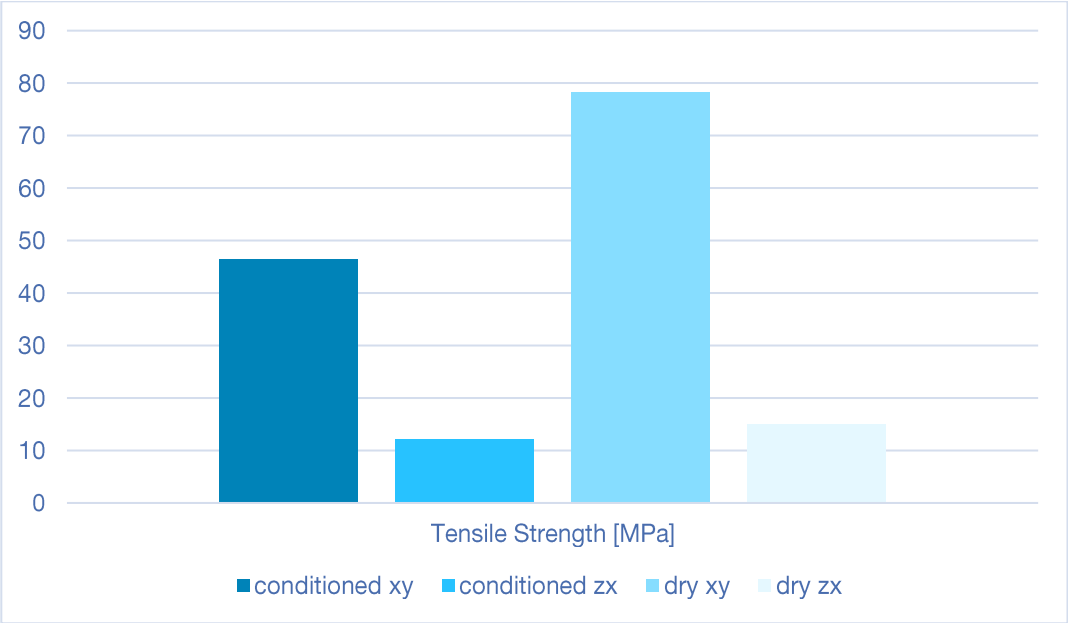
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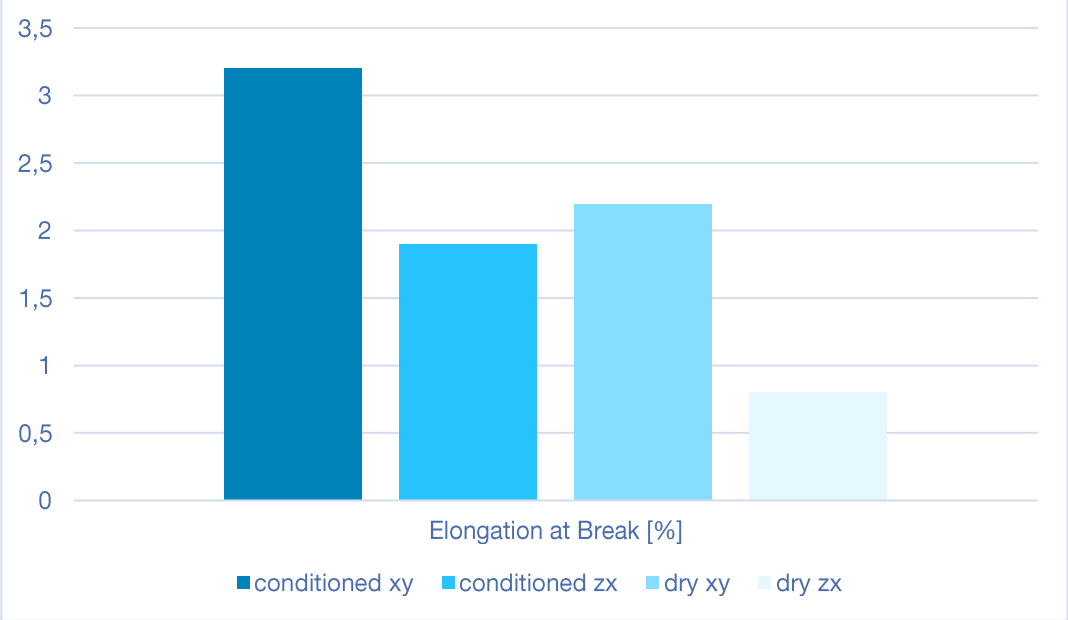
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Mechanical Properties Diagrams

Tensile Strength

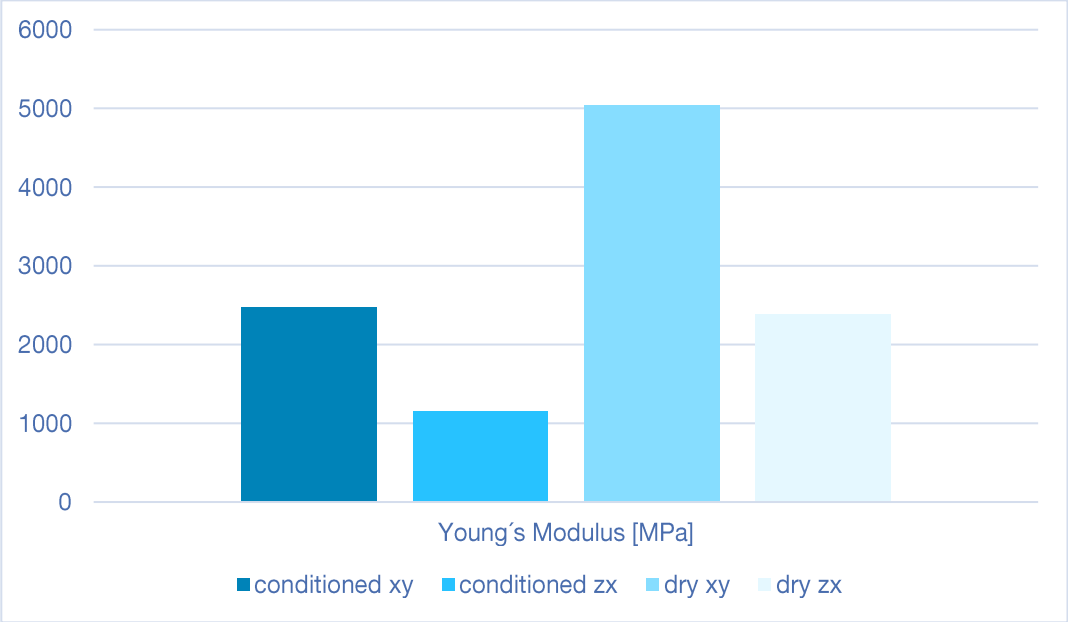


Tensile strength comparison Ultrafuse® PA6 GF30 conditioned and dry



Elongation at Break comparison Ultrafuse® PA6 GF30 conditioned and dry

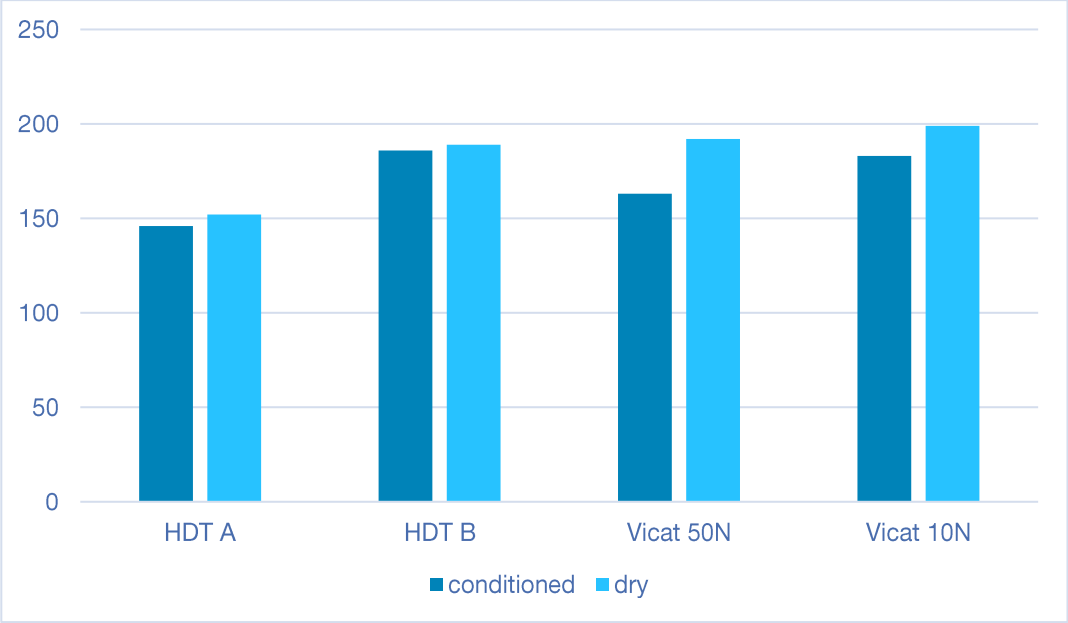
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Young´s Modulus comparison Ultrafuse® PA6 GF30 conditioned and dry

Thermal Properties Diagrams

HDT and Vicat



Heat resistance of Ultrafuse® PA6 GF30

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