Technical Data Sheet

Ultrafuse PA

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Version No.: 3.0

General information

Components

BASF Polyamide (PA) based filament for Fused Filament Fabrication.

Product Description

The key features of Ultrafuse® PA are the high strength and high modulus. Furthermore, Ultrafuse® PA shows a good thermal distortion stability.

Delivery form and warehousing

Ultrafuse® PA 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.

Product safety

Recommended: Process materials in a well ventilated room, or use professional extraction systems. For further and more detailed information please consult the corresponding material safety data sheets.

For your information

When melted, Ultrafuse® PA filament can be abrasive due to its glass reinforcement. Printing with Ultrafuse® PA may reduce brass nozzles and extruder driving wheels' lifetime. For a better experience, using hardened steel nozzles and extruder driving wheels is advised.

Disclaimer

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed.

Values in this document are average values, measured and calculated according to the instructions in the listed standards. The used specimens are produced with the Fused Filament Fabrication method.

Measured values can vary depending on used print orientation and print parameters.

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

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Filament Properties		
Filament Diameter	1.75 mm	2.85 mm
Diameter Tolerance	±0.050 mm	±0.075 mm
Roundness	±0.050 mm	±0.075 mm
Available Spool size	750 g	750 g
Available colors	Natural and Black	

Spool Properties	
Available Spool size	750 g
Outer diameter	200 mm
Inner diameter	50.5 mm
width	55 mm

Recommended 3D-Print processing parameters		Used for test specimens
Printer	FFF printer	Ultimaker S5
Nozzle Temperature	220 – 250 °C / 428 – 482 °F	245 °C / X °F
Build Chamber Temperature	-	Passively heated with closed chamber
Bed Temperature	90 – 120 °C / 194 – 248 °F	90 °C / X °F
Bed Material	Glass + PVA / PA adhesive	Glass + Magigoo PA
Nozzle Diameter	≥ 0.4 mm	0.4 mm
Print Speed	30 – 60 mm/s	X mm/s

Please check your print profile availability for an easy start at www.forward-am.com.

Further Recommendations	
Drying recommendations to ensure printability and best mechanical properties	80 °C in a hot air dryer or vacuum oven for at least 40 hours. Please note: To ensure constant material properties the material should always be kept dry.
Support material compatibility	Ultrafuse®, Single material breakaway

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General Properties		Standard
Density*[1]	1115 kg/m^3 / 69.6 lb/ft^3	ISO 1183-1

*measured on printe part

Thermal Properties		Standard
HDT A at 1.8 MPa[1]	57 °C / 134.6 °F	ISO 75-2
HDT B at 0.45 MPa[1]	113 °C / 235.4 °F	ISO 75-2
Vicat softening point @ 50 N[1]	160 °C / 320 °F	ISO 306
Vicat softening point @ 10 N[1]	189 °C / 372.2 °F	ISO 306
Glass Transition Temperature	49 °C / 120 °F	ISO 11357-2
Crystallization Temperature	147 °C / 297 °F	ISO 11357-3
Melting Temperature	195 - 197 °C / 383 - 386 °F	ISO 11357-3
Melt Volume Rate	49.5 cm^3/10 min / 3.02 in^3/10 min (275 °C, 5 kg)	ISO 1133

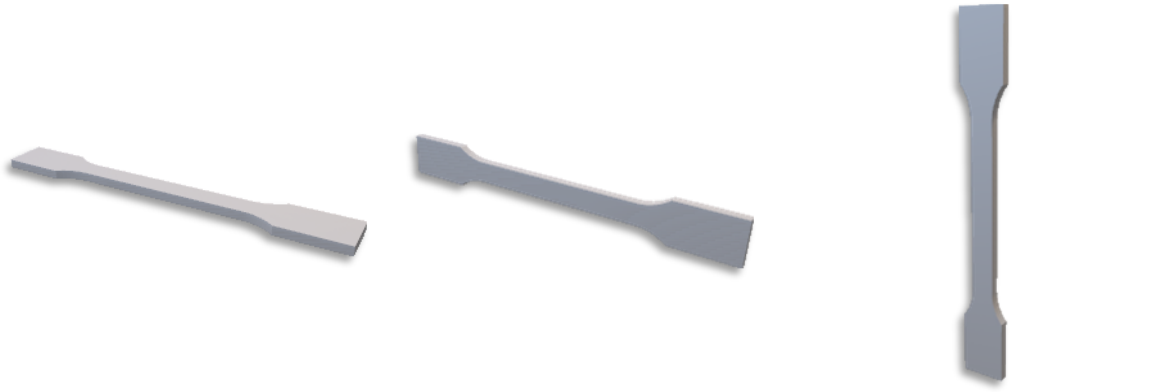
[1]Conditioning of the sample: dried (80°C, 504h)

Mechanical Properties[1] | Dried specimens

Print direction	Standard	XY	XZ	ZX
		Flat	On its edge	Upright
Tensile strength[2]	ISO 527	61.4 MPa / 8.9 ksi	-	16.4 MPa / 2.4 ksi
Elongation at Break[2]	ISO 527	9.6 %	-	0.8 %
Young's Modulus[3]	ISO 527	2419 MPa / 351 ksi	-	2122 MPa / 308 ksi
Flexural Strength[4]	ISO 178	X MPa / X ksi	X MPa / X ksi	40.2 MPa / 5.8 ksi
Flexural Modulus[4]	ISO 178	X MPa / X ksi	X MPa / X ksi	2149 MPa / 312 ksi
Flexural Elongation at Break[4]	ISO 178	No break	No break	1.8 %
Impact Strength Charpy (notched)	ISO 179-2	5.6 kJ/m^2	3.3 kJ/m^2	1.2 kJ/m^2
Impact Strength Charpy (unnotched)	ISO 179-2	23 kJ/m^2	29.7 kJ/m^2	3.5 kJ/m^2
Impact Strength Izod (notched)	ISO 180	5.8 kJ/m^2	3.9 kJ/m^2	1.7 kJ/m^2
Impact Strength Izod (unnotched)	ISO 180	28 kJ/m^2	45.6 kJ/m^2	3.2 kJ/m^2

[1]Conditioning of the specimens: dried (80°C, 504h)
[2]testing speed: 5 mm/min
[3]testing speed: 1 mm/min
[4]testing speed: 2 mm/min

Mechanical Properties[1] | Conditioned specimens



Print direction	Standard	XY	XZ	ZX
		Flat	On its edge	Upright
Tensile strength[2]	ISO 527	32.2 MPa / 4.8 ksi	-	17.6 MPa / 2.6 ksi
Elongation at Break[2]	ISO 527	143.3 %	-	12.8 %
Young's Modulus[3]	ISO 527	395 MPa / 57 ksi	-	334 MPa / 48 ksi
Flexural Strength[4]	ISO 178	No break	No break	No break
Flexural Modulus[4]	ISO 178	445 MPa / 64.5 ksi	468 MPa / 67.9 ksi	428 MPa / 62.1 ksi
Flexural Elongation at Break[4]	ISO 178	No break	No break	No break
Impact Strength Charpy (notched)	ISO 179-2	No break	No break	9.4 kJ/m^2
Impact Strength Charpy (unnotched)	ISO 179-2	No break	No break	13.4 kJ/m^2
Impact Strength Izod (notched)	ISO 180	85.4 kJ/m^2	106 kJ/m^2	10.1 kJ/m^2
Impact Strength Izod (unnotched)	ISO 180	No break	No break	17.4 kJ/m^2

[1]Conditioning of the specimens: Standard climate (23°C, 50% RH 72h)
[2]testing speed: 5 mm/min
[3]testing speed: 1 mm/min
[4]testing speed: 2 mm/min