



Ultrafuse[®] PLA Pro1

High speed | Outstanding
surface quality | High strength

Extended TDS

Complete Technical Documentation and
Testing Summary



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Technical Data Sheet

Easy printing, even at high speeds, and the outstanding surface quality are the key features of Ultrafuse® PLA Pro1.

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, 2.5 kg, 4.5 kg, 8.5 kg	750 g, 2.5 kg, 4.5 kg, 8.5 kg
Available colors	Natural white, black (RAL 9005), grey (RAL 7045)	

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 S5
Nozzle Temperature ¹⁾	200 – 220 °C	220 °C
Build Chamber Temperature	-	Indirect heating (cover)
Bed Temperature	50 – 70 °C	60 °C
Bed Material	Glass, PEI sheet	Glass
Nozzle Diameter	≥ 0.4 mm	0.4 mm
Print Speed	40 – 300 mm/s ¹	40 mm/s
Max Volumetric Speed ²⁾	22 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 0.4 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 properties³⁾

Ultrafuse® PLA Pro1 is in a printable condition, drying is not necessary.

Support material compatibility

Single material breakaway, Ultrafuse® BVOH

Warehousing

Ultrafuse® PLA Pro1 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	1254 kg/m ³
Poisson-Number	ISO 527	0.36

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

⁴⁾ measured on filament

Tensile Properties ⁵⁾	Standard	Average Values		
		XY-Direction	XZ-Direction	ZX-Direction
Tensile strength ⁶⁾	ISO 527	48.0 MPa	-	21.8 MPa
Elongation at Break ⁶⁾	ISO 527	21.9%	-	0.9%
Young's Modulus ⁷⁾	ISO 527	3166 MPa	-	2930 MPa

Flexural Properties ^{6) 8)}	Standard	Average Values		
		XY-Direction	XZ-Direction	ZX-Direction
Flexural Strength	ISO 178	92.4 MPa	99.1 MPa	-
Flexural Modulus	ISO 178	2823 MPa	2340 MPa	-
Flexural Elongation at Break	ISO 178	4.3%	4.4%	-

Impact Properties ⁶⁾	Standard	Average Values		
		XY-Direction	XZ-Direction	ZX-Direction
Impact Strength Charpy (unnotched)	ISO 179-2	20.4 kJ/m ²	18.8 kJ/m ²	-
Impact Strength Izod (unnotched)	ISO 180	-	-	-

For the diagrams on mechanical properties see Chapter: [Mechanical Properties Diagrams](#)

Thermal Properties ⁶⁾	Standard	Average Values
HDT A at 1.8 MPa	ISO 75-2	56 °C
HDT B at 0.45 MPa	ISO 75-2	59 °C
Vicat softening point at 50 N	ISO 306	58 °C
Vicat softening point at 10 N	ISO 306	61 °C
Glass Transition Temperature	ISO 11357-2	63 °C
Melt Volume-Flow Rate (MVR)	ISO 1133	18.2 cm ³ /10 min (210 °C, 2.16 kg)

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

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

⁶⁾ Testing speed: 5 mm/min

⁷⁾ Testing speed: 1 mm/min

⁸⁾ Testing speed: 2 mm/min

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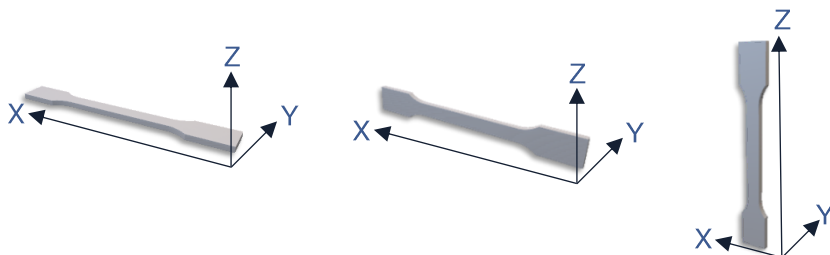
Hardness and Abrasion	Standard	Typical Values
Shore Hardness D (15s)	DIN ISO 7619-1	71

Biocompatibility	Standard	Typical Values
Cytotoxicity - Neutral Red	ISO 10993-5 (2009)	PASS
In Vivo Sensitization - Local Lymph Node Assay	ISO 10993-10 (2020)	PASS
In Vitro Skin Irritation	ISO 10993-10 (2013)	PASS

For the statement on Biocompatibility data see Chapter [Biocompatibility](#).

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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Biocompatibility

Product: Ultrafuse® PLA Pro1 grey

Revision: 01.06.2022

3D printed test items of the above stated product have fulfilled the requirements of tests as stated below:

Cytotoxicity Testing- Neutral Red:

(ISO 10993-5 (2009))

Human Skin Irritation Test:

(ISO 10993-10 (2013))¹¹⁾

In vitro Sensitization Testing- KeratinoSens™

(EN ISO 10993-10 (2020) and OECD 442D)

The Original test reports are available on request.

¹¹⁾ Patch test on 10 volunteers

The biocompatibility tests were recorded on test specimen of the referenced product to show compatibility of the material in general. The biocompatibility tests listed are not part of any continuous production protocol. The test assessments reflect only the test specimen and have to be retested on the final product. It remains the responsibility of the de-vice manufacturers and /or end-users to determine the suitability of all printed parts for their respective application.

For notice:

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