

Technical data sheet Tough PLA

Ultimaker

Chemical composition

See Tough PLA safety data sheet, section 3

Description

Ultimaker Tough PLA is a technical PLA filament with toughness comparable to Ultimaker ABS. Ideal for reliably printing technical models at larger sizes, our Tough PLA offers the same safe and easy use as regular PLA.

Key features

With an impact strength similar and higher stiffness compared to Ultimaker ABS, Tough PLA is less brittle than regular PLA and gives a more matte surface finish quality. Heat resistance is similar to standard PLA filaments, so printed parts should not be exposed to temperatures above 60 °C.

More reliable than ABS for larger prints, with no delamination or warping. Ultimaker Tough PLA is also compatible with Ultimaker support materials (PVA and Breakaway) giving full geometric freedom when designing parts.

Applications

Functional prototyping, tooling, manufacturing aids.

Non suitable for

Food contact and in-vivo applications. Long term outdoor usage or applications where the printed part is exposed to temperatures higher than 60 °C.

Filament specifications

	<u>Value</u>	<u>Method</u>
Diameter	2.85±0.05 mm	Ultra-fast CCS-based, dual-axis diameter gauge
Max roundness deviation	0.05 mm	Ultra-fast CCS-based, dual-axis diameter gauge
Net filament weight	750 g	-
Filament length	~96 m	-

Color information

<u>Color</u>	<u>Color code</u>
Tough PLA black	RAL 9017
Tough PLA white	RAL 9003
Tough PLA green	RAL 6038 (est.)
Tough PLA red	RAL 3018

Mechanical properties*

	<u>Injection molding</u>		<u>3D printing</u>	
	<u>Typical value</u>	<u>Test method</u>	<u>Typical value</u>	<u>Test method</u>
Tensile modulus	-	-	1820 MPa	ISO 527 (1 mm/min)
Tensile stress at yield	-	-	37 MPa	ISO 527 (50 mm/min)
Tensile stress at break	-	-	37 MPa	ISO 527 (50 mm/min)
Elongation at yield	-	-	3.1%	ISO 527 (50 mm/min)
Elongation at break	-	-	3.1%	ISO 527 (50 mm/min)
Flexural strength	-	-	78 MPa	ISO 178
Flexural modulus	-	-	2490 MPa	ISO 178
Izod impact strength, notched (at 23 °C)	-	-	9 kJ/m ²	ISO 180
Charpy impact strenght (at 23 °C)	-	-	-	-
Hardness	-	-	79 (shore D)	Durometer

Thermal properties

	<u>Typical value</u>	<u>Test method</u>
Melt mass-flow rate (MFR)	6-7 g/10 min	(210 °C, 2.16 kg)
Heat Deflection (HDT) at 0.455 MPa	-	-
Heat Deflection (HDT) at 1.82 MPa	-	-
Vicat softening temperature	63 °C	ISO 306
Glass transition	62 °C	DSC, 10 °C/min
Coefficient of thermal expansion	-	-
Melting temperature	151 °C	DSC, 10 °C/min
Thermal shrinkage	-	-

Other properties

	<u>Value</u>	<u>Test method</u>
Specific gravity	1.22	ISO 1183
Flame classification	-	-

*See notes

Notes

Properties reported here are average of a typical batch. The 3D printed test specimens were printed in the XY plane, using the fine quality profile in Ultimaker Cura 3.1, an Ultimaker 3, a 0.4mm AA print core, 90% infill, 0.1 mm layer height, and 205 °C nozzle temperature. The values are the average of 5 white specimens for the tensile, flexural, and impact tests. The Shore hardness D was measured in a 7-mm-thick square printed as indicated above with 100% infill. Ultimaker is constantly working on extending the TDS data.

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