Technical data sheet TPU 95A

Ultimaker

Chemical name	Thermoplastic polyurethane
Description	Highly versatile for industrial applications, TPU 95A filament is the go-to choice for a wide array of manufacturing projects that demand the qualities of both rubber and plastic. Designed for 3D printing consistency, TPU 95A is a semi-flexible and chemical resistant filament with strong layer bonding. In addition, it is easier and faster to print than other TPU filaments.
Key features	Exceptional wear and tear resistance, high impact strength, Shore-A hardness of 95, up to 580% elongation at break, and good corrosion resistance to many common industrial oils and chemicals.
Applications	Functional prototyping, grips, guides, hinges, sleeves, snap-fit parts and protective cases.
Non-suitable for	Food contact applications and in-vivo applications. Long term UV and/or moisture immersion and applications where the printed part is exposed to temperatures higher than 100 ˚C.

Filament specifications	Value	Method
Diameter	2.90±0.13 mm	2-axis laser gauge
Max roundness deviation	0.07 mm	2-axis laser gauge
Net filament weight	750 g	-
Filament length	~96 m	-

Color information	Color	Color code
	TPU 95A White	RAL 9010
	TPU 95A Black	RAL 9005
	TPU 95A Red	RAL 3031
	TPU 95A Blue	RAL 5002

Mechanical properties (*)	Injection molding		3D printing	
	Typical value	**Test method**	**Typical value**	**Test method**
Tensile modulus	-	-	26.0 MPa	ASTM D638
Tensile stress at yield	-	-	8.6 MPa	ASTM D638
Tensile stress at break	-	-	39.0 MPa	ASTM D638
Elongation at yield	-	-	55.0 %	ASTM D638
Elongation at break	-	-	580.0 %	ASTM D638
Flexural strength	-	-	4.3 MPa	ISO 179
Flexural modulus	-	-	78.7 MPa	ISO 179
Izod impact strength, notched (at 23˚C)	-	-	34.4 kJ/m^2	ISO 180
Charpy impact strength (at 23˚C)	-	-	-	-
Hardness	-	-	95 (Shore A) 46 (Shore D)	ASTM D2240 Durometer
Abrasion resistance	-	-	0.06 g	ASTM D4060 (mass loss, 10000 cycles)

Thermal properties	Typical value	Test method
Melt mass-flow rate (MFR)	15.9 g/10min	ISO 1133 (225 ˚C, 1.2 kg)
Heat deflection (HDT) at 0.455 MPa	74 ˚C	ASTM D648
Heat deflection (HDT) at 1.82 MPa	49 ˚C	ASTM D648
Glass transition	-24 ˚C	DSC
Coefficient of thermal expansion	$100 \cdot 10^{-6}$ ˚C^{-1}	ASTM E693
Melting temperature	220 ˚C	DSC
Thermal shrinkage	-	-

Electrical properties	Typical value	Test method
Volume resistivity	10^{11} Ω·m	IEC 60093
Surface resistance	$2 \cdot 10^{14}$ Ω	IEC 60093

(*) See notes.

Other properties	Typical value	Test method
Specific gravity	1.22	ASTM D782
Flame classification	HB Class	ICE 60695-11-10
Moisture absorption	0.18 %	ASTM D570 (24h)

Notes

Properties reported here are average of a typical batch. The tensile test bars were printed with 2 shells, 107% material flow, nozzle temperature 260 °C, bed temperature 45 °C, nozzle diameter 0.8 mm, 40 mm/s infill speed, 30 mm/s print speed, and layer height 0.3 mm. The flexural and impact bars were printed in the XY plane, using the normal quality profile in Cura 2.1, an Ultimaker 2+, a 0.4 mm nozzle, 90% infill, 235 °C nozzle temperature and 70 °C build plate temperature. The values are the average of 5 white and 5 black specimens for the flexural and impact test. The Shore hardness D was measured in a 7-mm-thick square printed in the XY plane, using the normal quality profile in Cura 2.5, an Ultimaker 3, a 0.4 mm print core and 100% infill. Ultimaker is constantly working on extending the TDS data.

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Version Version 3.010

Date 16/05/2017

Ultimaker