Technical data sheet TPU 95A

Ultimaker

Chemical composition	See TPU 95A safety data sheet, section 3
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	Dual-axis laser gauge
Max roundness deviation	0.07 mm	Dual-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 MPa	ASTM D638
Tensile stress at yield	-	-	8.6 MPa	ASTM D638
Tensile stress at break	-	-	39 MPa	ASTM D638
Elongation at yield	-	-	55%	ASTM D638
Elongation at break	-	-	580%	ASTM D638
Flexural strength	-	-	4.3 MPa	ISO 178
Flexural modulus	-	-	78.7 MPa	ISO 178
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, 10,000 cycles)

Electrical properties*

	Value	**Test method**	**Typical value**	**Test method**
Volume resistivity	10^{11} Ω·m	IEC 60093	-	-
Surface resistance	$2 \cdot 10^{14}$ Ω	IEC 60093	-	-
Dissipation factor (at 1 MHz)	-	-	0.058	ASTM D150-11
Dielectric constant (at 1 MHz)	-	-	4.12	ASTM D150-11

Thermal properties

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

*See notes

Other properties

	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 two 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 Ultimaker 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 five white and five 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 Ultimaker Cura 2.5, an Ultimaker 3, a 0.4 mm print core and 100% infill. The electrical properties were measured on a 54-mm-diameter disk with 3 mm thickness printed in the XY plane, using the fine quality profile (0.1 mm layer height) in Ultimaker Cura 3.2.1, an Ultimaker 3, a 0.4 mm print core, and 100% infill. Ultimaker is constantly working on extending the TDS data.

Disclaimer

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