# Technical data sheet TPU 95A

Ultimaker

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|---|---|
| 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 high temperatures. 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 | - |

| Color information | Color | Color code |
|---|---|---|
| | TPU 95A White | RAL 9010 |

| 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) | - | - | 19.1 J/m$^2$ | ASTM D256 |
| Charpy impact strength (at 23˚C) | - | - | - | - |
| Hardness | - | - | 95 (Shore A) | ASTM D2240 |
| 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 (flow) | $100 \cdot 10^{-6}$ ˚C$^{-1}$ | ASTM E693 |
| Coefficient of thermal expansion (xflow) | - | - |
| 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 |

| 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) |

(*) See notes.

## 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 impact and heat deflection specimens were printed with 2 shells, nozzle temperature 245 °C, bed temperature 40 °C, nozzle diameter 0.5 mm, 40 mm/s infill speed, 30 mm/s print speed, and layer height 0.2 mm. The tensile bars were printed in the XY plane, using the normal quality profile in Cura 2.1, an UM2+, a 0.4 mm nozzle, 90% infill, 235 °C nozzle temperature and 70 °C build plate temperature. Ultimaker is constantly working on extending the TDS data.

## Disclaimer



**Version** Version 3.005

**Date** 28/02/2017