Technical data sheet PP

Ultimaker

Chemical composition	See PP safety data sheet, section 3
Description	Ultimaker PP (polypropylene) is durable. It has high toughness, exceptional fatigue resistance, and low friction. It also has good chemical, temperature, and electrical resistance. PP is one of the most widely used plastics on the planet. From electrical components to living hinges, PP is the go-to material for prototyping and end-use products
Key features	Durable with high toughness and fatigue resistance (PP retains its shape after torsion, bending, and/or flexing); low friction and smooth surfaces; semi-flexible; chemical-resistant to a wide range of bases and acids, including industrial cleaning agents; high electrical resistance; translucent; low density resulting in lightweight parts (high strength-to-weight ratio); excellent layer bonding; adequate bed adhesion and low warping when using adhesion sheets
Applications	Functional prototypes, living hinges, connectors, lab equipment, moldings, stationery folders, packaging, storage boxes, protective covers, and light shades
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 105 °C

Filament specifications

	Value	**Method**
Diameter	2.85 ± 0.05 mm	-
Max roundness deviation	-	-
Net filament weight	500 g	-
Filament length	~ 88 m	-

Color information

Color	**Color code**
PP Natural	N/A

Mechanical properties*

	Injection molding		3D printing	
	Typical value	**Test method**	**Typical value**	**Test method**
Tensile modulus	390 MPa	ISO 527	220 MPa	ISO 527 (1 mm/min)
Tensile stress at yield	14 MPa	ISO 527	8.7 MPa	ISO 527 (50 mm/min)
Tensile stress at break	No break within testing range	ISO 527	No break within testing range	ISO 527 (50 mm/min)
Elongation at yield	13%	ISO 527	18%	ISO 527 (50 mm/min)
Elongation at break	> 200%	ISO 527	> 300%	ISO 527 (50 mm/min)
Flexural strength	14 MPa	ISO 178	13 MPa	ISO 178
Flexural modulus	350 MPa	ISO 178	305 MPa	ISO 178
Izod impact strength, notched (at 23 °C)	-	-	27.1 kJ/m^2	ISO 180
Charpy impact strength (at 23 °C)	10 kJ/m^2	ISO 179	-	
Hardness	55 (Shore D)	ISO 868	45 (Shore D)	Durometer

Electrical properties*

	Value	**Test method**	**Typical value**	**Test method**
Volume resistivity	> 10^{16} Ω·cm	(Typical value)		
Dissipation factor (at 1 MHz)	-	-	0.003	ASTM D150-11
Dielectric constant (at 1 MHz)	-	-	1.91	ASTM D150-11

Thermal properties

	Typical value	**Test method**
Melt mass-flow rate (MFR)	20 g/10 min	ISO 1133 (230 °C, 2.16 kg)
Heat detection (at 0.455 MPa)	-	-
Heat deflection (at 1.82 MPa)	-	-
Vicat softening temperature at 5N	115 °C	ISO 306
Glass transition	-	-
Coefficient of thermal expansion	-	-
Melting temperature	130 °C	DSC
Thermal shrinkage	-	-

*See notes

Other properties

	Value	Test method
Specific gravity	0.89	ISO 1183
Flame classification	-	-
Haze (1mmt)	28%	ISO 14782
Gloss	90%	ASTM D523

Notes

Properties reported here are average of a typical batch. The 3D printed test specimens were printed in the XY plane, using the normal quality profile in Ultimaker Cura 2.5, an Ultimaker 3, a 0.4 mm AA print core, and 90% infill. The values are the average of five natural 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. 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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