Technical data sheet PP

Ultimaker

Chemical name	Polypropylene
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; good heat resistance (up to 105 ˚C); semi-flexible; chemical-resistant to a wide range of bases and acids, including industrial cleaning agents; high electrical resistance; very resistant to moisture; 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
	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 0 ˚C)	10 kJ/m^2	ISO 179	-	-
Hardness	55 (Shore D)	ISO 868	45 (Shore D)	Durometer

Thermal properties	Typical value	Test method
Melt mass-flow rate (MFR)	20 g/10 min	ISO 1133 (230 ˚C, 2.16 kg)
Heat deflection (HDT) at 0.455 MPa	-	-
Heat deflection (HDT) 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	-	-

Electrical properties	Typical value	Test method
Volume resistivity	> 10^{16} Ω·cm	(typical value)
Surface resistance	-	-

(*) See notes.

Other properties	Typical 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 specimens were printed in the XY plane, using the normal quality profile in Cura 2.5, an Ultimaker 3, a 0.4 print core, and 90% infill. The values are the average of 5 natural specimens for the tensile, flexural, and impact tests. The shore hardness D was measured in a 7-mm-thick square plate printed as indicated above with 100% infill. Ultimaker is constantly working on extending the TDS data.

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