Ultimaker

PETG
Technical data sheet

General overview

Chemical composition	See PETG safety data sheet, section 3.
Description	Ultimaker PETG sets the standard for industrial applications. Easy to use and versatile, it's the best PETG on the market for Ultimaker 3D printers, and is suitable for a wide range of use cases.
Key features	Available in a variety of colors – including translucent and fluorescent – Ultimaker PETG is perfectly suited for a range of applications, thanks to properties such as good printability, toughness, resistance to alcohols and weak acids or bases, and temperature resistance up to 76 °C. Ultimaker PETG can be used with Ultimaker support materials (PVA and Breakaway).
Applications	Visual prototyping, functional prototyping, short-run manufacturing, custom components, fit testing, tooling, custom connectors or packages for liquids.
Non-suitable for	In vivo applications. Applications where the printed part is exposed to temperatures higher than 76 °C.

Filament specifications

	Method (standard)	**Value**
Diameter	–	2.85 ± 0.05 mm
Max roundness deviation	–	0.05 mm
Net filament weight	–	750 g
Filament length	–	~ 93 m

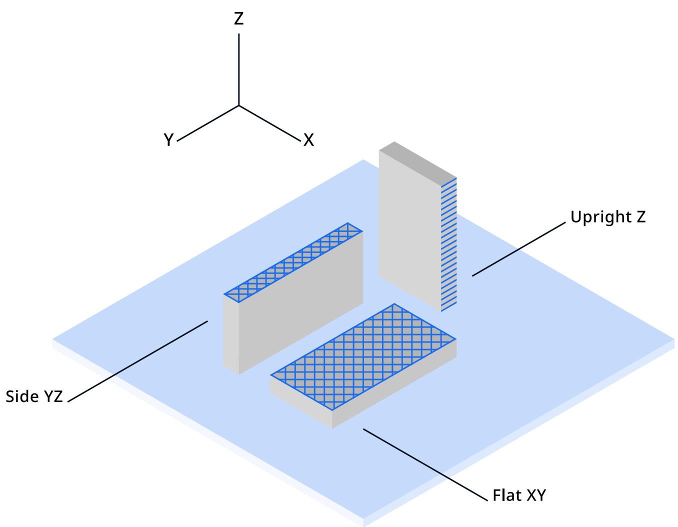
Color information

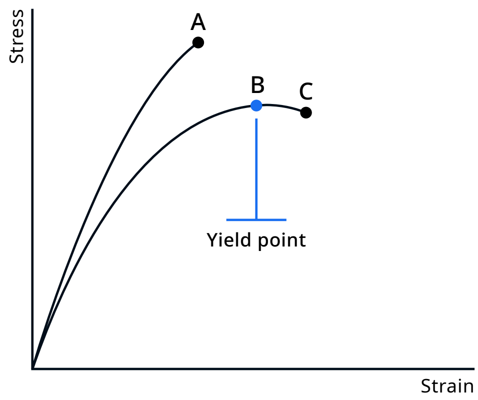
Color	**Color code**
PETG Black	RAL 9017
PETG White	RAL 9003
PETG Silver	RAL 9006
PETG Grey	RAL 7012
PETG Transparent	N/A
PETG Blue	RAL 5005
PETG Blue Translucent	Pantone 286 C
PETG Red	RAL 3020
PETG Red Translucent	Pantone 7622 C
PETG Green	RAL 6024
PETG Green Translucent	Pantone 3425 C
PETG Yellow	RAL 1016
PETG Yellow Fluorescent	Pantone 3570 C
PETG Orange	Pantone 1655 C

Mechanical properties

All samples were 3D printed. See 'Notes' section for details.

	Test method	Typical value		
		XY (Flat)	YZ (Side)	Z (Up)
Tensile (Young's) modulus	ASTM D3039 (1 mm / min)	1939 ± 28 MPa	1874 ± 31 MPa	1711 ± 45 MPa
Tensile stress at yield	ASTM D3039 (5 mm / min)	46.2 ± 0.8 MPa	50.3 ± 1.0 MPa	No yield
Tensile stress at break	ASTM D3039 (5 mm / min)	38.5 ± 1.4 MPa	44.0 ± 3.7 MPa	19.0 ± 6.4 MPa
Elongation at yield	ASTM D3039 (5 mm / min)	5.9 ± 0.1 %	6.0 ± 0.2 %	No yield
Elongation at break	ASTM D3039 (5 mm / min)	7.6 ± 0.2 %	6.4 ± 0.6 %	1.8 ± 0.8 %
Flexural modulus	ISO 178 (1 mm / min)	1882 ± 30 MPa	1681 ± 61 MPa	1489 ± 25 MPa
Flexural strength	ISO 178 (5 mm / min)	78.9 ± 1.0 MPa at 5.5% strain	75.8 ± 2.0 MPa at 5.5% strain	50 ± 3.5 MPa at 3.6% strain
Flexural strain at break	ISO 178 (5 mm / min)	No break (> 10%)	No break (> 10%)	3.6 ± 0.4 %
Charpy impact strength (at 23 °C)	ISO 179-1 / 1eB (notched)	7.9 ± 0.6 kJ/m²	–	–
Hardness	ISO 7619-1 (Durometer, Shore D)	76 Shore D	–	–





A. Tensile stress at break, elongation at break (no yield point)
B. Tensile stress at yield, elongation at yield
C. Tensile stress at break, elongation at break

Print orientation

As the FFF process produces parts in a layered structure, mechanical properties of the part vary depending on orientation of the part. In-plane there are differences between walls (following the contours of the part) and infill (layer of 45° lines). These differences can be seen in the data for XY (printed flat on the build plate – mostly infill) and YZ (printed on its side – mostly walls). Additionally, the upright samples (Z direction) give information on the strength of the interlayer adhesion of the material. Typically the interlayer strength (Z) has the lowest strength in FFF. Note: All samples are printed with 100% infill – blue lines in the illustration indicate typical directionality of infill and walls in a printed part.

Tensile properties

Printed parts can yield before they break, where the material is deforming (necking) before it breaks completely. When this is the case, both the yield and break points will be reported. Typical materials that yield before breaking are materials with high toughness like Tough PLA, Nylon and CPE+. If the material simply breaks without yielding, only the break point will be reported. This is the case for brittle materials like PLA and PC Transparent, as well as elastomers (like TPU).

Thermal properties

Samples marked with an asterisk (*) were 3D printed. See 'Notes' section for details.

	Test Method	Typical value
Melt mass-flow rate (MFR)	ISO 1133 (190 °C, 2.16 kg)	6.4 g / 10 min
Heat deflection (HDT) at 0.455 MPa*	ISO 75-2 / B	76.2 ± 0.8 °C
Vicat softening temperature*	ISO 306 / A120	82.9 ± 0.4 °C
Glass transition	ISO 11357 (DSC, 10 °C / min)	77.4 °C
Melting temperature	ISO 11357 (DSC, 10 °C / min)	– (amorphous)
Thermal shrinkage	–	–
Coefficient of thermal expansion	–	–

Other properties

Specific gravity	ISO 1183	1.27 g / cm^3
Flame classification	–	–

Notes

3D printed samples were printed using a new spool of material loaded in an Ultimaker S5 Pro Bundle using engineering intent profiles, 0.15 mm layer height, 100% infill, and a print core AA 0.4, prepared using Ultimaker Cura 4.9. Samples were printed one part at a time. Printed samples were conditioned at room temperature for at least 24 hours before measuring.

Specimen dimensions (L x W x H):
- Tensile test: 215 x 20 x 4 mm
- Flexural/Vicat/HDT: 80 x 10 x 4 mm
- Charpy: 80 x 10 x 4 mm with printed Notch (Type 1eB)

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Version	v1.01
Date	May 19, 2021