UltiMaker ABS-R Method

Technical data sheet

General overview

Chemical composition	Acrylonitrile butadiene styrene
Key features	Print manufacturing-grade ABS without warping and superior printing reliability and performance on Method and Method XL printers to achieve incomparable ABS parts with unprecedented ease
Applications	Consistent and repeatable ABS prototypes, tools and parts
Non-suitable for	Food contact and in vivo applications. Applications where the printed part is exposed to temperatures higher than 105°C

Filament specifications

	Method (standard)	**Value**
Diameter	-	1.75 +/- 0.05 mm
Max. roundness deviation	-	0.05 mm
Net filament weight	-	650 g
Filament length	-	~257 m

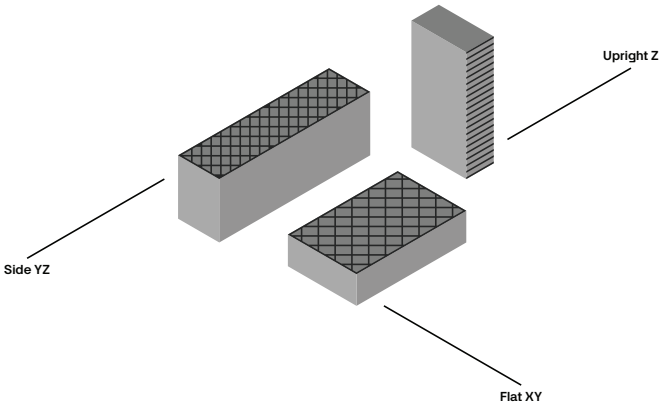
Color information

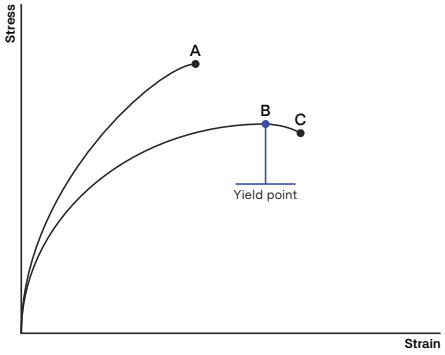
Color	**Color code**
Black	
Natural	
Red	

Mechanical properties

All samples where 3D printed, see notes section.

	Test Method	Typical value XY (flat)	Typical value YZ (side)	Typical value Z (up)
Tensile (Young's) modulus	ASTM D3039 (1 mm / min)	2278 ± 80 MPa	2408 ± 46 MPa	2300 ± 70 MPa
Tensile stress at yield	ASTM D3039 (5 mm / min)	29.3 ± 1.0 MPa	31.2 ± 0.4 MPa	No yield
Tensile stress at break	ASTM D3039 (5 mm / min)	31.2 ± 1.1 MPa	33.8 ± 0.5 MPa	26.1 ± 1.3 MPa
Elongation at yield	ASTM D3039 (5 mm / min)	2.9 ± 0.2 %	2.5 ± 0.04 %	No yield
Elongation at break	ASTM D3039 (5 mm / min)	8.8 ± 1.3 %	5.7 ± 1.2 %	1.9 ± 0.2 %
Flexural modulus	ISO 178 (1 mm / min)	2095 ± 75 MPa	1832 ± 98 MPa	1976 ± 52 MPa
Flexural strength	ISO 178 (5 mm / min)	63.7 ± 1.1 MPa at 5.3 % strain	66.7 ± 0.9 MPa at 5.5 % strain	46.0 ± 2.7 MPa at 2.5 % strain
Flexural strain at break	ISO 178 (5 mm / min)	44.8 ± 4.1 MPa	58.8 ± 5.4 MPa at 7.3 % strain	No break (> 0%)
Charpy impact strength, notched (at 23 °C)	ISO 179-1 / 1eB (notched)	**8.2 ± 0.5 kJ/m²**	-	-
Izod impact strength, unnotched (at 23 °C)	ISO 180	15.8 ± 1.1 kJ/m²	16.2 ± 2.1 kJ/m²	6.9 ± 0.8 kJ/m²
Hardness	ISO 7619-1 (Durometer, Shore D)	68 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 part 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 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 ilustration 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 Transparant, as well as elastomers (like TPU).

Thermal properties

	Test Method	Typical value
Melt mass-flow rate (MFR)	ISO 1133 (255 °C, 2.16 kg)	0 g / 0 min
Heat Deflection(HDT) at 0.455 MPa*	ASTM D648 / B	103.3°C
Heat Deflection(HDT) at 1.82 MPa	ASTM D648 / A	95.8°C
Vicat softening temperature*	ISO 306 / A120	112.5°C
Glass transition	ISO 11357 (DSC, 10 °C / min)	106°C
Melting temperature	ISO 11357 (DSC, 10 °C / min)	- (amorphous)

Other properties

	Test Method	Typical value
Specific gravity		
Specific density	ISO 1183-1	1.04

Notes

*3D printing: all samples were printed using a new spool of material loaded in a Method XL printer with Fast solid 0.2 profiles and UltiMaker Cura 5.6. Samples were printed ‘one-at-a-time’. Printed samples were conditioned in room temperature for at least 24 h 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) and Izod unnotched

Disclaimer