

Tough 2000 Resin

Resin for Rugged Prototyping

Tough 2000 Resin is the strongest and stiffest material in our functional family of Tough and Durable Resins. Choose Tough 2000 Resin for prototyping strong and sturdy parts that should not bend easily.

Strong and stiff prototypes

Sturdy jigs and fixtures

ABS-like strength and stiffness



FLT02001



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Prepared 10/07/2020

Rev. 03 03/04/2025

To the best of our knowledge the information contained herein is accurate. However, Formlabs, Inc. makes no warranty, expressed or implied, regarding the accuracy of these results to be obtained from the use thereof.

Material Properties	METRIC ¹			IMPERIAL ¹			METHOD
	Green ²	Low Warp Cure (Room Temp) ³	Full Properties Cure (70 °C) ⁴	Green ²	Low Warp Cure (Room Temp) ³	Full Properties Cure (70 °C) ⁴	
Tensile Properties	METRIC ¹			IMPERIAL ¹			METHOD
Ultimate Tensile Strength	34 MPa	42 MPa	46 MPa	6092 psi	6092 psi	6672 psi	ASTM D638-14
Tensile Modulus	1630 MPa	1960 MPa	2100 MPa	284 ksi	284 ksi	305 ksi	ASTM D638-14
Elongation at Break	86%	51%	44%	54%	51%	44%	ASTM D638-14
Flexural Properties	METRIC ¹			IMPERIAL ¹			METHOD
Flexural Strength	49 MPa	67 MPa	71 MPa	7107 psi	9718 psi	10298 psi	ASTM D790-17
Flexural Modulus	1320 MPa	1760 MPa	1810 MPa	191 ksi	255 ksi	263 ksi	ASTM D790-17
Impact Properties	METRIC ¹			IMPERIAL ¹			METHOD
Notched Izod	79 J/m	40 J/m	41 J/m	1.5 ft-lb/in	0.75 ft-lb/in	0.77 ft-lb/in	ASTM D256-10
Unnotched Izod	208 J/m	Not Tested	715 J/m	3.9 ft-lb/in	Not Tested	13 ft-lb/in	ASTM D4812-11
Gardner at 1/32" (0.97 mm) thickness	Not Tested	Not Tested	1.1 J	Not Tested	Not Tested	10 in-lb	ASTM D5420-21
Fracture Properties	METRIC ¹			IMPERIAL ¹			METHOD
Maximum Stress Intensity Factor (K _{max})	Not Tested	Not Tested	1.2 MPa · m ^{1/2}	Not Tested	Not Tested	1090 psi · in ^{1/2}	ASTM D5045-14
Work of Fracture (W _f)	Not Tested	Not Tested	115 J/m ²	Not Tested	Not Tested	7.9 ft-lb/ft ²	ASTM D5045-14
Thermal Properties	METRIC ¹			IMPERIAL ¹			METHOD
Heat Deflection Temp. @ 1.8 MPa	42 °C	48 °C	50 °C	108 °F	118 °F	122 °F	ASTM D648-16
Heat Deflection Temp. @ 0.45 MPa	48 °C	54 °C	59 °C	118 °F	129 °F	138 °F	ASTM D648-16
Thermal Expansion (0-150°C)	107 µm/m/°C	Not Tested	91 µm/m/°C	59 µin/in/°F	Not Tested	50 µin/in/°F	ASTM E831-13

¹ Material properties can vary with part geometry, print orientation, print settings, and temperature.

² Data was obtained from green parts, printed using Form 4, 100 µm, Tough 2000 settings, without additional treatments.

³ Data was obtained from parts printed using Form 4, 100 µm, Tough 2000 settings and post-cured with a Form Cure (2nd generation) for 7 minutes at Room Temperature.

⁴ Data was obtained from parts printed using Form 4, 100 µm, Tough 2000 settings and post-cured with a Form Cure (2nd generation) for 7 minutes at 70 °C.

SOLVENT COMPATIBILITY

Percent weight gain over 24 hours for a printed 1 x 1 x 1 cm cube immersed in respective solvent:

Solvent	24 hr weight gain, %	Solvent	24 hr weight gain, %
Acetic Acid 5%	0.7	Isooctane (aka gasoline)	< 0.1
Acetone	18.8	Mineral oil (light)	0.1
Isopropyl Alcohol	3.7	Mineral oil (Heavy)	0.2
Bleach ~5% NaOCl	0.6	Salt Water (3.5% NaCl)	0.6
Butyl Acetate	6.2	Sodium Hydroxide solution (0.025% PH 10)	0.6
Diesel Fuel	0.1	Water	0.6
Diethyl glycol Monomethyl Ether	5.3	Xylene	4.1
Hydraulic Oil	< 0.1	Strong Acid (HCl conc)	3.0
Skydrol 5	0.9		
Hydrogen peroxide (3%)	0.6		