ENGINEERING RESIN

Tough 2000

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

(V1)   **FLTO2001**   *** May not be available in all regions**   **form**labs

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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 DATA

Tough 2000 Resin

	METRIC [1]		IMPERIAL [1]		METHOD
	Green[2]	Post-Cured [3]	Green[2]	Post-Cured [3]	
Tensile Properties					
Ultimate Tensile Strength	29 MPa	46 MPa	4206 psi	6671 psi	ASTM D638-14
Tensile Modulus	1.2 GPa	2.2 GPa	174 ksi	329 ksi	ASTM D638-14
Elongation at Break	74%	48%	74%	48%	ASTM D638-14
Flexural Strength	17 MPa	65 MPa	2465 psi	9427 psi	ASTM D 790-15
Flexural Properties					
Flexural Modulus	0.45 GPa	1.9 GPa	65 ksi	275 ksi	ASTM D 790-15
Impact Properties					
Notched IZOD	79 J/m	40 J/m	1.5 ft-lbf/in	0.75 ft-lbf/in	ASTM D256-10
Temperature Properties					
Heat Deflection Temp. @ 1.8 MPa	42 °C	53 °C	108 °F	127 °F	ASTM D 648-16
Heat Deflection Temp. @ 0.45 MPa	48 °C	63 °C	118 °F	145 °F	ASTM D 648-16
Thermal Expansion (0-150°C)	107 μm/m/°C	91 μm/m/°C	59 μin/in/°F	50 μin/in/°F	ASTM E 831-13

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

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

[3] Data was obtained from parts printed using Form 2, 100 μm, Tough 2000 settings and post-cured with a Form Cure for 120 minutes at 80 °C.

SOLVENT COMPATIBILITY

Percent weight gain over 24 hours for a printed and post-cured 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	Mineral oil (Light)	0.2
Acetone	18.8	Mineral oil (Heavy)	0.1
Bleach ~5% NaOCl	0.6	Salt Water (3.5% NaCl)	0.6
Butyl Acetate	6.2	Skydrol 5	0.9
Diesel Fuel	< 0.1	Sodium Hydroxide solution (0.025% PH 10)	0.6
Diethyl glycol Monomethyl Ether	5.3	Strong Acid (HCl conc)	3.0
Hydraulic Oil	< 0.1	Tripropylene glycol monomethyl ether	1.0
Hydrogen peroxide (3%)	0.6	Water	0.6
Isooctane (aka gasoline)	< 0.1	Xylene	4.1
Isopropyl Alcohol	3.7		