

ENGINEERING RESIN

Tough 1500

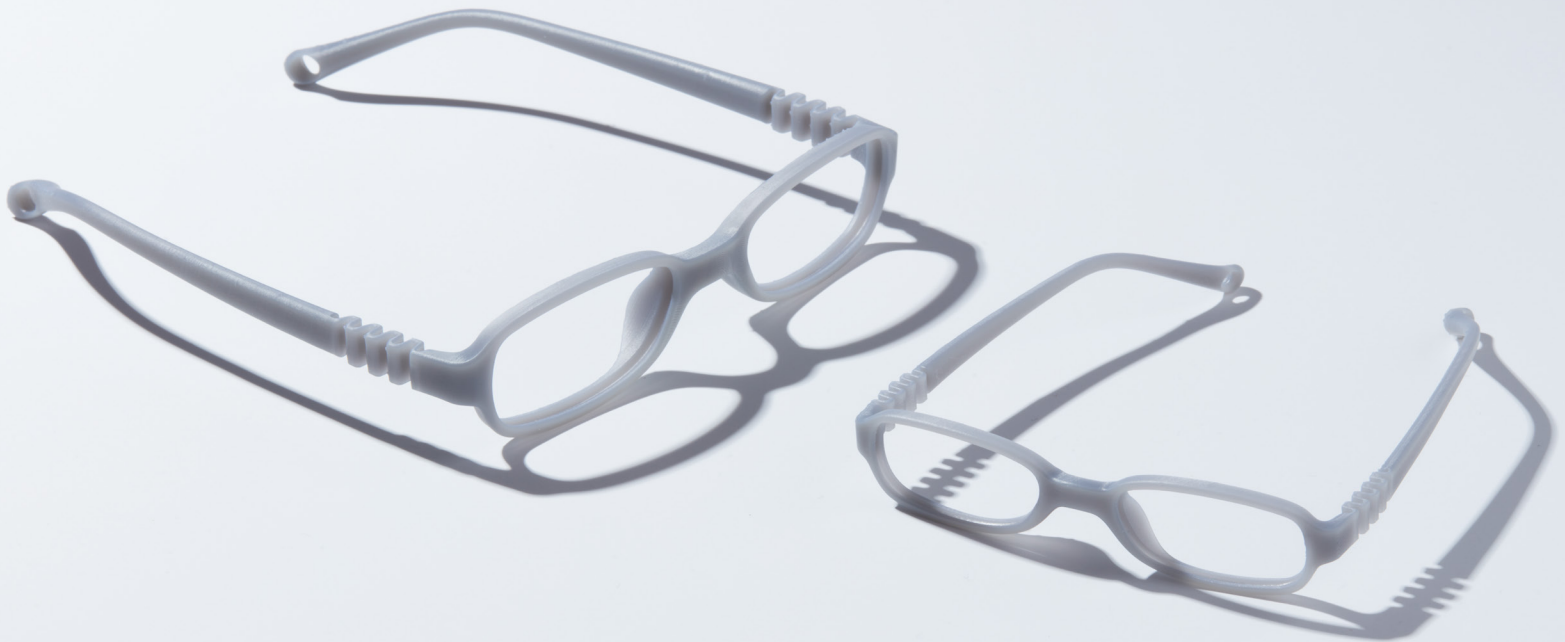
Tough 1500 Resin for Resilient Prototyping

Tough 1500 Resin is the most resilient material in our functional family of Tough and Durable Resins. It produces stiff and pliable parts that bend and spring back quickly under cyclic loading.

Springy prototypes and assemblies

Snap fit and press fit connectors

Polypropylene-like strength



FLTO1501

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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.

Tough 1500 Resin Material Properties Data

| | METRIC ¹ | | IMPERIAL ¹ | | METHOD |
|----------------------------------|---------------------|-------------------------|-----------------------|-------------------------|---------------|
| | Green ² | Post-Cured ³ | Green ² | Post-Cured ³ | |
| Mechanical Properties | | | | | |
| Ultimate Tensile Strength | 26 MPa | 33 MPa | 3771 psi | 4786 psi | ASTM D 638-14 |
| Tensile Modulus | 0.94 GPa | 1.5 GPa | 136 ksi | 218 ksi | ASTM D 638-14 |
| Elongation at Break | 69 % | 51 % | 69 % | 51 % | ASTM D 638-14 |
| Flexural Properties | | | | | |
| Flexural Strength | 15 MPa | 39 MPa | 2175 psi | 5656 psi | ASTM D 790-15 |
| Flexural Modulus | 0.44 GPa | 1.4 GPa | 58 ksi | 203 ksi | ASTM D 790-15 |
| Impact Properties | | | | | |
| Notched IZOD | 72 J/m | 67 J/m | 1.3 ft-lbf/in | 1.2 ft-lbf/in | ASTM D256-10 |
| Unnotched IZOD | 902 J/m | 1387 J/m | 17 ft-lbf/in | 26 ft-lbf/in | ASTM D4812-11 |
| Thermal Properties | | | | | |
| Heat Deflection Temp. @ 1.8 MPa | 34 °C | 45 °C | 93 °F | 113 °F | ASTM D 648-16 |
| Heat Deflection Temp. @ 0.45 MPa | 42 °C | 52 °C | 108 °F | 126 °F | ASTM D 648-16 |
| Thermal Expansion | 114 µm/m/°C | 97 µm/m/°C | 63 µin/in/°F | 54 µin/in/°F | ASTM E 831-13 |

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

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

³Data was obtained from parts printed using Form 2, 100 µm and post-cured with a Form Cure for 60 minutes at 70 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 Hour Weight Gain (%) | Solvent | 24 Hour Weight Gain (%) |
|---------------------------------|-------------------------|-------------------------------------|-------------------------|
| Acetic Acid, 5 % | 0.75 | Hydrogen Peroxide (3 %) | 0.71 |
| Acetone | 19.07 | Isooctane | 0.02 |
| Isopropyl Alcohol | 3.15 | Mineral Oil, light | 0.05 |
| Bleach, ~5 % NaOCl | 0.62 | Mineral Oil, heavy | 0.09 |
| Butyl Acetate | 5.05 | Salt Water (3.5 % NaCl) | 0.66 |
| Diesel | 0.11 | Sodium hydroxide (0.025 %, pH = 10) | 0.7 |
| Diethyl glycol monomethyl ether | 5.25 | Water | 0.69 |
| Hydraulic Oil | 0.17 | Xylene | 3.22 |
| Skydrol 5 | 0.46 | Strong Acid (HCl Conc) | 4.39 |