STEREOLITHOGRAPHY

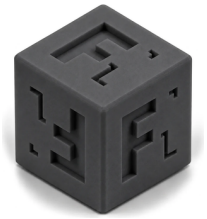
Tough 2000 Resin

ABS-Like Resin for Stiff, Strong Functional Parts

Tough 2000 Resin is the ABS-like Formlabs resin: as stiff as ABS sheet, stronger in tension, and tough enough to stretch 79% before it breaks. Housings, brackets, jigs and snap-fit enclosures hold their shape under load and resist shattering, with the smooth, detailed surface of SLA and a dark grey matte finish.



SURFACE FINISHES



Standard Finish Natural

Parts are washed, post-cured and have their supports removed, leaving the smooth, finely detailed surface SLA is known for. Sharp edges, small text and fine features hold their shape, and the surface is ready for fit checks, assembly, presentation or paint.



Performance Paint Premium Finish

A highly durable, automotive-grade coating, hand-finished for smooth surfaces and applied with professional-grade equipment for exceptional adhesion. It comes in matte to semi-gloss, with custom colour matching for parts that need specific branding or visual impact.

BUILD VOLUME	LEAD TIME	LAYER HEIGHT	TOLERANCE
353 × 196 × 350 mm	**2-4 business days**	**0.05-0.1 mm**	**±0.25% (min ±0.25 mm)**

MECHANICAL PROPERTIES

Modulus and strength show how stiff the resin is and how much load it carries; elongation and impact show how tough it is. Read the two together: Tough 2000 Resin pairs ABS-level stiffness with high elongation at break, which is what ABS-like means in practice. The part feels rigid in the hand, and under overload it stretches well past its yield point before it fractures.

The fracture values show how well a part resists a crack growing from a notch or sharp corner, Ross flex fatigue counts bending cycles to failure, and the creep figure shows how little a part moves under a constant load over two weeks. Generous fillets at snap-fit roots, bosses and inside corners get the most from that toughness.

PROPERTY	VALUE	TEST STANDARD
Ultimate Tensile Strength	**40.4 MPa**	ASTM D638-14
Tensile Modulus	**1800 MPa**	ASTM D638-14
Elongation at Yield	**4.5 %**	ASTM D638-14
Elongation at Break	**79 %**	ASTM D638-14

Flexural Strength	**67 MPa**	ASTM D790-17
Flexural Modulus	**1701 MPa**	ASTM D790-17
Izod Impact, Notched	**25 J/m**	ASTM D256-10
Izod Impact, Unnotched	**325 J/m**	ASTM D4812-11
Charpy Impact, Notched	**2.4 kJ/m²**	ISO 179-1
Charpy Impact, Unnotched	**31 kJ/m²**	ISO 179-1
Gardner Impact (0.79 mm)	**1.6 J**	ASTM D5420-21
Maximum Stress Intensity Factor (Kmax)	**1.65 MPa·m½**	ASTM D5045-14
Work of Fracture	**305 J/m²**	ASTM D5045-14
Ross Flex Fatigue (23 °C, 30° at 1 Hz)	**3560 cycles**	Formlabs internal method
Flexural Creep Strain (4 MPa, 22 °C, 14 days)	**1.3 %**	ISO 6602

THERMAL PROPERTIES

Heat deflection is listed at two loads. Lightly loaded housings can be judged against the lower-load figure, while brackets and fixtures that carry stress should be judged against the higher-load figure; parts that run hotter belong in High Temperature Resin or FDM ABS.

The glass transition from dynamic mechanical analysis marks where stiffness falls away. Thermal expansion is typical of a tough photopolymer, so allow for it where a part mates with metal across a wide temperature swing.

PROPERTY	VALUE	TEST STANDARD
HDT @ 0.45 MPa	**70 °C**	ASTM D648-16
HDT @ 1.8 MPa	**57 °C**	ASTM D648-16
Glass Transition (DMA, tan δ peak)	**112 °C**	DMA, 3 °C/min
Thermal Expansion (0–150 °C)	**134.2 ×10⁻⁶/K**	ASTM E831-19

PHYSICAL PROPERTIES

Hardness and density describe the cured part. A high Shore D hardness gives a hard, scratch-resistant surface, and Formlabs improved scratch resistance in the V2 formulation, which keeps handled housings and fixtures looking clean.

PROPERTY	VALUE	TEST STANDARD
Shore Hardness D	**76**	ASTM D2240
Bulk Density	**1.09 g/cm³**	ASTM D792-20

ELECTRICAL PROPERTIES

Tough 2000 Resin is an electrical insulator. Volume resistivity and dielectric strength support enclosures that sit around live electronics, and the dielectric constant and dissipation factor at 50 Hz and 1 kHz help evaluate it near power and signal circuits.

It is not static dissipative; ESD Resin is the Formlabs option for static-sensitive assemblies.

PROPERTY	VALUE	TEST STANDARD
Volume Resistivity	**3×10^{15} Ω·cm**	ASTM D257-14
Dielectric Strength	**15.5 kV/mm**	ASTM D149-20
Dielectric Constant (50 Hz)	**3.46**	ASTM D150
Dielectric Constant (1 kHz)	**3.38**	ASTM D150
Dissipation Factor (50 Hz)	**0.018**	ASTM D150
Dissipation Factor (1 kHz)	**0.012**	ASTM D150

CHEMICAL PROPERTIES

Formlabs immersed post-cured cubes for 24 hours and measured weight gain, and separately measured tensile strength, modulus and elongation after one day and one week of immersion to ASTM D543. Water, salt water, diesel, hydraulic and mineral oils, Skydrol, dilute acids and bases, bleach and hydrogen peroxide barely swell it, and after a week in the fluids tested to ASTM D543, solvents aside, parts keep nearly all of their tensile strength and stiffness.

Elongation is the value to watch for parts that rely on stretch. A week in Skydrol cuts elongation at break by more than half, and dilute hydrochloric acid, sodium hydroxide and water also reduce it, so snap-fits that will see those fluids should be tested in them.

Gasoline, acetone, xylene and butyl acetate swell it strongly, and long soaks in isopropyl alcohol or acetone cut its strength. Keep parts away from gasoline and strong solvents; Formlabs has not tested other fuels such as jet fuel or kerosene. Chemical ratings are screening guidance at room temperature; confirm exposure with application-specific testing before production release.

CHEMICAL	24 H WEIGHT GAIN	STRENGTH RETAINED, 1 WEEK	MODULUS RETAINED, 1 WEEK	ELONGATION RETAINED, 1 WEEK
Acetic acid 5%	**0.17%**	**Not tested**	**Not tested**	**Not tested**
Acetone	**22.92%**	**39%**	**45%**	**144%**
Bleach (~5% NaOCl)	**0.11%**	**92%**	**95%**	**123%**
Butyl acetate	**18.65%**	**Not tested**	**Not tested**	**Not tested**
Diesel fuel	**0.08%**	**92%**	**97%**	**131%**
Diethylene glycol monomethyl ether	**4.65%**	**Not tested**	**Not tested**	**Not tested**
Hydraulic oil	**0.06%**	**Not tested**	**Not tested**	**Not tested**
Hydrochloric acid 10%	**Not tested**	**99%**	**104%**	**65%**
Hydrochloric acid, concentrated	**1.96%**	**Not tested**	**Not tested**	**Not tested**
Hydrogen peroxide 3%	**0.21%**	**93%**	**92%**	**133%**
Isooctane (gasoline)	**21.24%**	**Not tested**	**Not tested**	**Not tested**
Isopropyl alcohol	**4.21%**	**27%**	**18%**	**197%**
Mineral oil (light)	**0.12%**	**Not tested**	**Not tested**	**Not tested**
Mineral oil (heavy)	**0.07%**	**Not tested**	**Not tested**	**Not tested**

Motor oil	**Not tested**	**96%**	**98%**	**173%**
Salt water (3.5% NaCl)	**0.16%**	**Not tested**	**Not tested**	**Not tested**
Skydrol 5	**0.96%**	**94%**	**98%**	**45%**
Sodium hydroxide 0.025% (pH 10)	**0.18%**	**97%**	**100%**	**78%**
Tripropylene glycol monomethyl ether	**1.86%**	**Not tested**	**Not tested**	**Not tested**
Water	**0.19%**	**97%**	**106%**	**85%**
Xylene	**27.69%**	**Not tested**	**Not tested**	**Not tested**

COMPLIANCE

Formlabs rates post-cured Tough 2000 Resin V2 UL 94 HB, declares its resins compliant with the EU RoHS directive, and its EU safety data sheet lists no ingredient on the REACH candidate list.

Formlabs publishes no biocompatibility, food-contact or flame-retardant rating for Tough 2000 Resin, so it is used for parts outside patient and food contact; Flame Retardant Resin is the Formlabs option where a flame-rated part is required.

STANDARD	STATUS
UL 94 flammability Formlabs datasheet rating for post-cured Tough 2000 Resin V2; not flame retardant	HB
RoHS Directive 2011/65/EU Formlabs states its resins are produced in accordance with the EU RoHS directive (statement covers all Formlabs resins)	Formlabs declaration
REACH SVHC (EC 1907/2006) No ingredient on the REACH candidate list, authorisation list or restriction list (Formlabs EU safety data sheet for Tough 2000 Resin V2, 2025-09-18)	Formlabs SDS

MANUFACTURING

Surface finish	**Smooth, injection-moulded quality surface from the photopolymerization process**

SUPPORTING DOCUMENTS

RoHS declaration