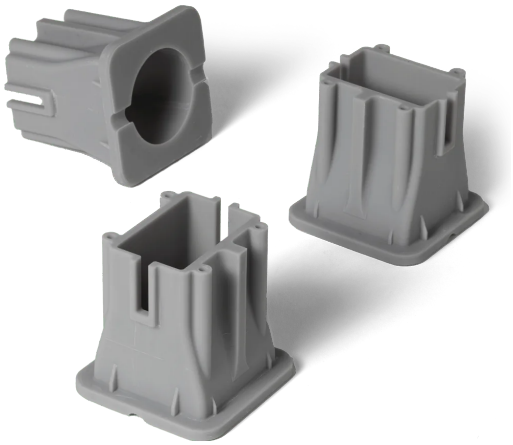
STEREOLITHOGRAPHY

Flame Retardant Resin

Self-Extinguishing UL 94 V-0 Resin for Enclosures and Interiors

Flame Retardant Resin is a self-extinguishing, halogen-free SLA resin rated UL 94 V-0 at 3 mm on a UL Blue Card. It produces stiff, creep-resistant parts with a smooth moulded finish for electronics enclosures, connector housings, aircraft and rail interior prototypes, and industrial parts near heat or ignition sources.



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

Tensile and flexural modulus show how stiff the resin is, and elongation shows how far it stretches before it breaks. Flame Retardant Resin is stiffer than Tough 2000, the ABS-like Formlabs resin, while keeping enough stretch for compliant snap tabs and press-in inserts.

Properties are listed for the two Formlabs post-cure schedules. The longer, hotter cure adds stiffness, strength and creep resistance and trades away a little elongation. Notched impact is modest, so generous internal radii keep housings tough at corners and screw bosses.

PROPERTY	VALUE	TEST STANDARD
Ultimate Tensile Strength (Post-Cured 70 °C, 60 min)	**38 MPa**	ASTM D638-14
Ultimate Tensile Strength (Post-Cured 80 °C, 120 min)	**41 MPa**	ASTM D638-14
Tensile Modulus (Post-Cured 70 °C, 60 min)	**2900 MPa**	ASTM D638-14
Tensile Modulus (Post-Cured 80 °C, 120 min)	**3100 MPa**	ASTM D638-14
Elongation at Break (Post-Cured 70 °C, 60 min)	**9.4 %**	ASTM D638-14

Elongation at Break (Post-Cured 80 °C, 120 min)	**7.1 %**	ASTM D638-14
Flexural Strength (Post-Cured 70 °C, 60 min)	**72 MPa**	ASTM D790-15
Flexural Strength (Post-Cured 80 °C, 120 min)	**75 MPa**	ASTM D790-15
Flexural Modulus (Post-Cured 70 °C, 60 min)	**2700 MPa**	ASTM D790-15
Flexural Modulus (Post-Cured 80 °C, 120 min)	**2700 MPa**	ASTM D790-15
Notched Izod Impact (Post-Cured 70 °C, 60 min)	**22 J/m**	ASTM D256-10
Notched Izod Impact (Post-Cured 80 °C, 120 min)	**22 J/m**	ASTM D256-10
Unnotched Izod Impact (Post-Cured 70 °C, 60 min)	**241 J/m**	ASTM D4812-11
Unnotched Izod Impact (Post-Cured 80 °C, 120 min)	**257 J/m**	ASTM D4812-11
Maximum Stress Intensity Factor, Kmax (Post-Cured 70 °C, 60 min)	**1.05 MPa·m½**	ISO 20795-1:2013, 8.6
Maximum Stress Intensity Factor, Kmax (Post-Cured 80 °C, 120 min)	**1.11 MPa·m½**	ISO 20795-1:2013, 8.6
Work of Fracture (Post-Cured 70 °C, 60 min)	**311 J/m²**	ISO 20795-1:2013, 8.6
Work of Fracture (Post-Cured 80 °C, 120 min)	**277 J/m²**	ISO 20795-1:2013, 8.6

THERMAL PROPERTIES

Heat deflection is listed at two loads for both cures. The longer cure raises heat deflection and glass transition, so it suits parts that carry load near heat sources, such as fixtures and heater holders.

The UL relative thermal index is the long-term temperature UL assigns for continuous service, while heat deflection describes short-term stiffness under load; match each to how hot and how long the part runs. Thermal expansion is lower after the longer cure, which helps where a part mates with metal.

PROPERTY	VALUE	TEST STANDARD
HDT @ 0.45 MPa (Post-Cured 70 °C, 60 min)	**94 °C**	ASTM D648-16
HDT @ 0.45 MPa (Post-Cured 80 °C, 120 min)	**111 °C**	ASTM D648-16
HDT @ 1.8 MPa (Post-Cured 70 °C, 60 min)	**71 °C**	ASTM D648-16
HDT @ 1.8 MPa (Post-Cured 80 °C, 120 min)	**83 °C**	ASTM D648-16
Glass Transition Temperature (Post-Cured 70 °C, 60 min)	**130 °C**	DMA, peak of tan δ, 3 °C/min
Glass Transition Temperature (Post-Cured 80 °C, 120 min)	**144 °C**	DMA, peak of tan δ, 3 °C/min
Thermal Expansion, 20–80 °C (Post-Cured 70 °C, 60 min)	**98.6 ×10⁻⁶/K**	ASTM E831-13
Thermal Expansion, 20–80 °C (Post-Cured 80 °C, 120 min)	**68.1 ×10⁻⁶/K**	ASTM E831-13
Relative Thermal Index, Electrical and Mechanical (1.5–3.0 mm)	**50 °C**	UL 746B

PHYSICAL PROPERTIES

Part density and hardness describe the finished, post-cured part; liquid density and viscosity describe the resin in the vat. The resin is viscous, so small blind holes and narrow channels need drainage paths to wash cleanly.

PROPERTY	VALUE	TEST STANDARD
Part Density	**1.25 g/cm³**	ASTM D792-20
Shore Hardness D (Post-Cured)	**80**	ASTM D2240
Resin Density (liquid)	**1.18 g/cm³**	Formlabs SDS
Resin Viscosity (liquid, 25 °C)	**4500–5000 cP**	Formlabs TDS

ELECTRICAL PROPERTIES

High dielectric strength and volume resistivity make the resin an insulator for enclosures, connector bodies, bobbins and relay housings. Formlabs measured these values on parts post-cured at 70 °C for 60 minutes.

PROPERTY	VALUE	TEST STANDARD
Dielectric Strength	**15.1 kV/mm**	ASTM D149
Dielectric Constant (0.5 MHz)	**3.83**	ASTM D150
Dielectric Constant (1 MHz)	**3.82**	ASTM D150
Dissipation Factor (0.5 MHz)	**0.024**	ASTM D150
Dissipation Factor (1 MHz)	**0.025**	ASTM D150
Volume Resistivity	**2.1 × 10¹⁵ Ω·cm**	ASTM D257

CHEMICAL PROPERTIES

Formlabs immersed printed, post-cured cubes in 26 fluids for 24 hours and measured weight gain. Gasoline, diesel, engine and transmission oils, brake fluid, Skydrol 5, hydraulic oil, cleaners and dilute acids and bases leave almost no change, acetone causes the largest gain, and 30% sulfuric acid disintegrated the sample.

Weight gain is screening guidance; confirm long-term or hot exposure with application-specific testing before production release.

CHEMICAL	24 H WEIGHT GAIN
Acetone	**2.1%**
Bleach (~5% NaOCl)	**0.3%**
Windex Powerized Formula	**0.3%**
Hydrogen peroxide 30%	**1%**
Soapy water	**0.2%**
Tripropylene glycol monomethyl ether (TPM)	**0.1%**
Distilled water	**0.2%**
Hydrochloric acid 10%	**< 0.1%**
Sodium hypochlorite solution	**< 0.1%**
Sodium hydroxide 0.025% (pH 10)	**0.3%**
Salt water (3.5% NaCl)	**0.2%**

Isopropyl alcohol	**0.2%**
Hydrogen peroxide 3%	**0.2%**
Butyl acetate	**0.4%**
Sulfuric acid 30%	**Disintegrated**
Gasoline (ISO 1817, liquid C)	**< 0.1%**
Transmission fluid (synthetic ATF)	**< 0.1%**
Engine oil (SAE 5W-30)	**< 0.1%**
Brake fluid (DOT 4)	**< 0.1%**
Diesel (No. 2)	**< 0.1%**
Power steering fluid	**< 0.1%**
Skydrol 5	**< 0.1%**
Hydraulic oil	**< 0.1%**
Diethylene glycol monomethyl ether	**0.3%**
Mineral oil (heavy)	**< 0.1%**
Mineral oil (light)	**< 0.1%**

COMPLIANCE

Each status shows what Formlabs provides: the UL 94 and IEC 60695-11-10 ratings come from a UL Blue Card, and the FAR 25.853, smoke, toxic gas and outgassing results come from independent laboratory reports Formlabs publishes with its datasheet. Formlabs ran the flame, smoke and toxic gas tests on parts post-cured at 70 °C for 60 minutes. Flame ratings depend on wall thickness, so design walls to 3 mm where V-0 is required.

The UL listing's processing conditions name Formlabs Form 3 series printers and the default Form Cure schedule; Forge prints this resin on Formlabs Form 4L printers. Polishing or priming with mineral oil or other flammable lubricants may invalidate the UL rating.

STANDARD	STATUS
UL 94 flammability UL Blue Card (file E530674): V-0 at 3.0 mm, V-1 at 2.5 mm and HB at 1.5 mm in grey; the listing covers Formlabs Form 3, 3B, 3+, 3B+, 3L and 3BL printers, 50–100 µm layers, horizontal and vertical builds	V-0 at 3 mm
IEC 60695-11-10 flammability Also certified to IEC requirements on the same UL Blue Card: V-0 at 3.0 mm, V-1 at 2.5 mm and HB75 at 1.5 mm	V-0 at 3 mm
14 CFR 25.853 (FAR 25.853) Appendix F, Part I 12-second vertical burn passed at 2.5 mm (Formlabs datasheet FLFRGR01, Rev. 02, 2023): 0.67 s average after-flame, 0.17 in average burn length, no flaming drips	Formlabs test report
ASTM E662 smoke density Flaming mode Ds at 4 min of 114 at 5 mm and 285 at 3 mm (Formlabs datasheet FLFRGR01, Rev. 02, 2023); Formlabs states 5 mm samples pass on a Ds < 200 at 4 min criterion	Formlabs test report
BSS 7239 toxic gas Passed at 3 mm: CO 56 ppm, HCN 7 ppm, SO_2, HCl, HF and NOx each below 1 ppm (Formlabs datasheet FLFRGR01, Rev. 02, 2023)	Formlabs test report
ASTM E595 (Outgassing) TML 0.87%, CVCM < 0.01%, WVR 0.2% (Formlabs datasheet FLFRGR01, Rev. 02, 2023), within the common 1.0% TML and 0.10% CVCM screening levels	Formlabs test report
RoHS Directives 2011/65/EU and (EU) 2015/863 Restricted substances not contained or intentionally added above the threshold limits (statement covers all Formlabs resins)	Formlabs declaration

REACH SVHC (EC 1907/2006) No substances on the ECHA candidate list (June 2024 statement; all Formlabs resins except Clear Resin; the safety data sheet lists none)	Formlabs declaration

SUPPORTING DOCUMENTS

RoHS declaration