formlabs

ENGINEERING RESIN

Flexible 80A Resin V2

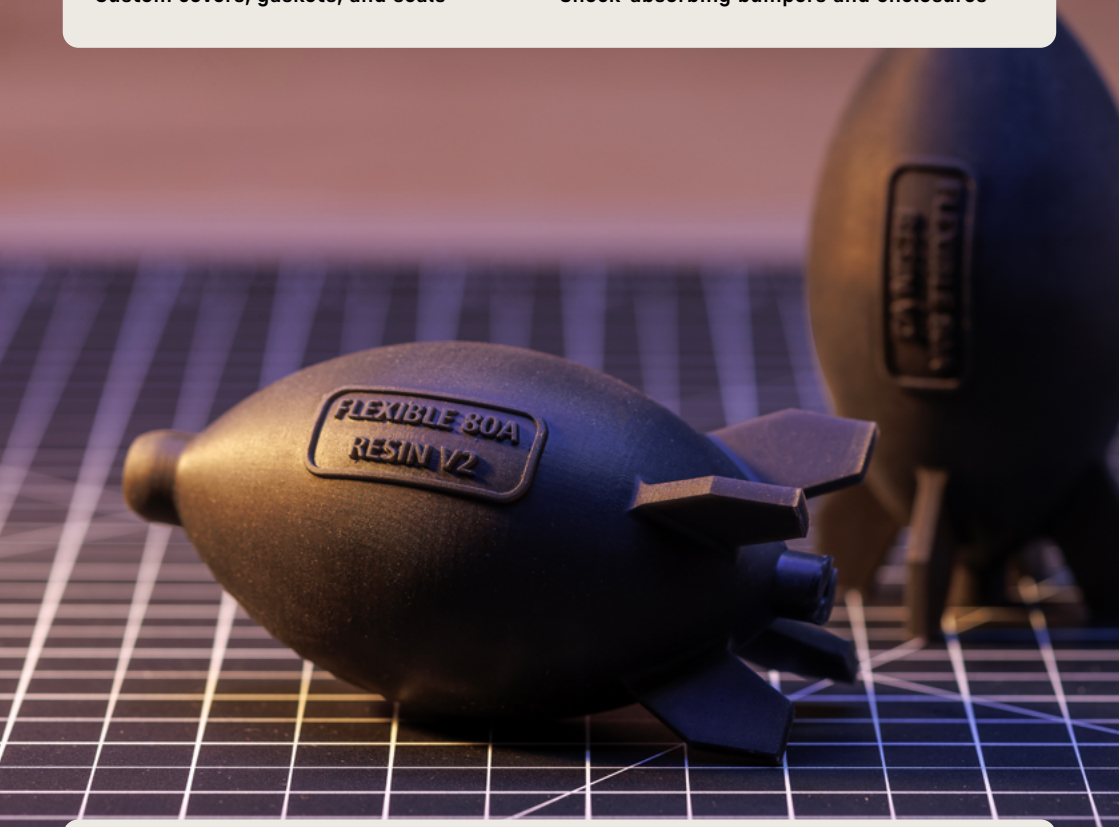
Resilient elastomeric 3D printing material that rivals the look, feel, and function of 80A cast urethanes, TPUs, and hard rubbers.

Functional prototypes and end-use parts with the look and feel of cast urethanes

Custom covers, gaskets, and seals

Soft inserts, jigs, and fixtures that protect precision components and finished surfaces while withstanding repeated use

Shock-absorbing bumpers and enclosures



V2 **FLFL8002**

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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.

Flexible 80A Resin V2 is a resilient 3D printing elastomer that rivals the look, feel, and function of 80A cast urethanes, TPUs, and hard rubbers.

Parts printed in Flexible 80A Resin V2 snap back into place and withstand repeated bending, tension, and compression.

Flexible 80A Resin V2 is a new material formulation that leverages the technology of Form 4 Series printers to deliver 2x higher tear strength, 2x higher elongation at break, 4x higher rebound, and improved aesthetics and aging compared to the previous version.

Material Properties	METRIC [1]		IMPERIAL [1]		METHOD
	Green	**Post-Cured [2]**	**Green**	**Post-Cured [2]**	
Tensile Properties	METRIC [1]		IMPERIAL [1]		METHOD
Ultimate Tensile Strength [3]	4.0 MPa	10.0 MPa	580 psi	1450 psi	ASTM D412-16
Stress at 50% Elongation	1.5 MPa	2.9 MPa	218 psi	421 psi	ASTM D412-16
Stress at 100% Elongation	2.3 MPa	4.7 MPa	334 psi	682 psi	ASTM D412-16
Stress at 200% Elongation	3.8 MPa	8.6 MPa	551 psi	1247 psi	ASTM D412-16
Elongation at Break	210%	230%	210%	230%	ASTM D412-16
Tear Strength [4]	11 kN/m	28 kN/m	63 lb/in	160 lb/in	ASTM D624-00
Compression Set (23 °C for 22 hours)	Not Tested	32%	Not Tested	32%	ASTM D395-03 (B)
Compression Set (70 °C for 22 hours)	Not Tested	85%	Not Tested	85%	ASTM D395-03 (B)
Pendulum Rebound (Schob Type)	Not Tested	56%	Not Tested	56%	ASTM D7121
Bayshore Resilience	Not Tested	58%	Not Tested	58%	ASTM D2632
Other Properties	METRIC [1]		IMPERIAL [1]		METHOD
Shore A Hardness	68	83	68	83	ASTM D2240
Ross Flex Fatigue at 23 °C	2,808 cycles	2,808 cycles	2,808 cycles	2,808 cycles	ASTM D1052, no initial 100 °C aging, 90 degree deflection, notched, 100 cycles/min
Ross Flex Fatigue at -10 °C	37,619 cycles	37,619 cycles	37,619 cycles	37,619 cycles	ASTM D1052, no initial 100 °C aging, 90 degree deflection, notched, 100 cycles/min
Thermal Properties	METRIC [1]		IMPERIAL [1]		METHOD
Glass transition temperature (Tg)	Not Tested	-49 °C	Not Tested	-56 °F	DMA, Tension mode
Other Properties	METRIC [1]				METHOD
Solid Density	1.09 g/cm^3				ASTM D792-20
Viscosity at 25 °C	3310 cPs				ASTM D7867
Liquid Density	1.04 g/mL				ASTM D792-20

[1] Material properties may vary based on part geometry, print orientation, print settings, temperature, and disinfection or sterilization methods used.

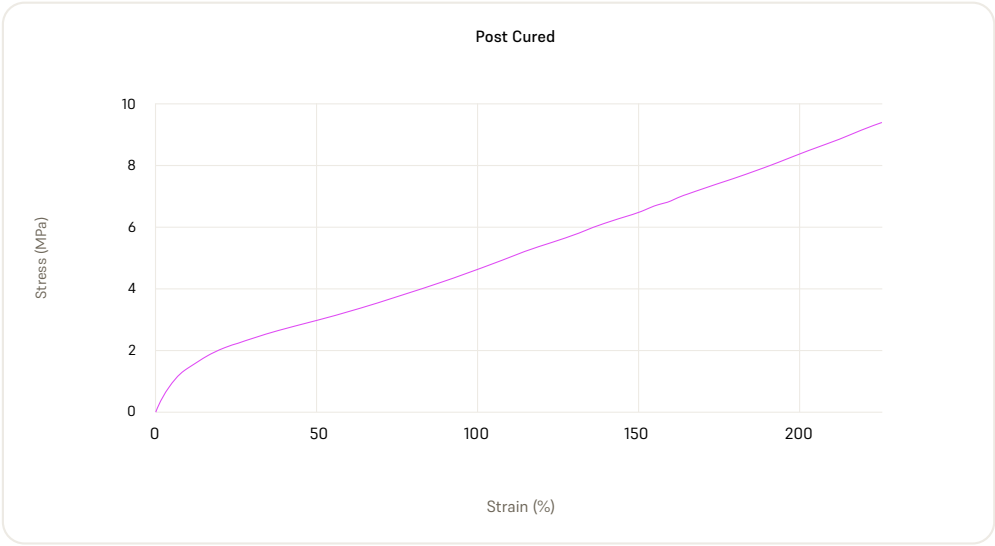
[2] Data for post-cured samples were printed on a Form 4 printer with 100 µm Flexible 80A Resin V2 settings, washed in a Form Wash for 10 minutes in ≥99% Isopropyl Alcohol, and post-cured at room temperature for 5 minutes in water and 80°C for 5 minutes in air in a Form Cure V2 L.

[3] Tensile testing was performed after 3+ hours at 23 °C, using a Die C specimen cut from sheets. Pull rate = 500 mm/min.

[4] Tear testing was performed after 3+ hours at 23 °C, using a Die C tear specimen directly printed. Pull rate = 500 mm/min.

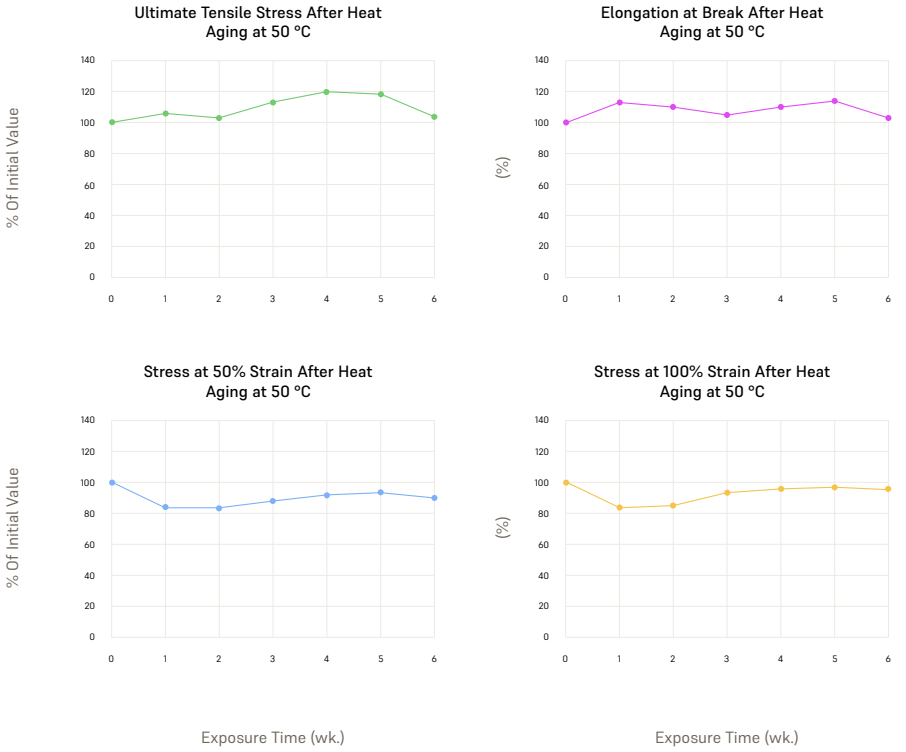
Representative Tensile Curves (ASTM D412)

Type C, 500 mm/min



Heat Aging (ASTM D3045)

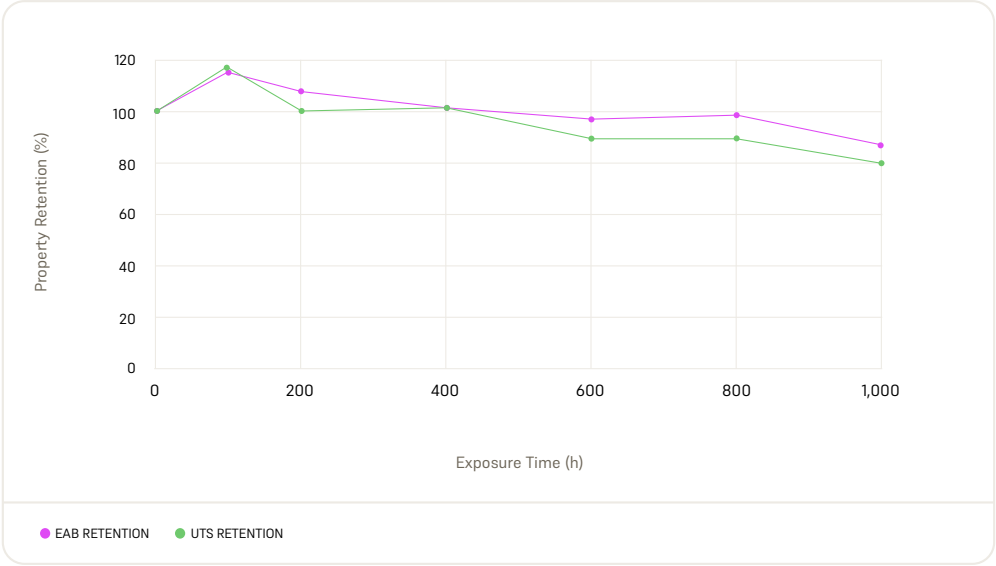
Formlabs evaluated the heat aging performance of Flexible 80A Resin V2 using ASTM D3045, a test method for evaluating heat aging of plastics without load. In this test, mechanical properties of samples placed in a 50 °C environment are measured at different durations of time for up to 6 weeks. According to the standard, a test time of 6 weeks at 50 °C can be interpreted as approximately 1 year at ambient temperature.



Indoor Aging (ASTM D4459)

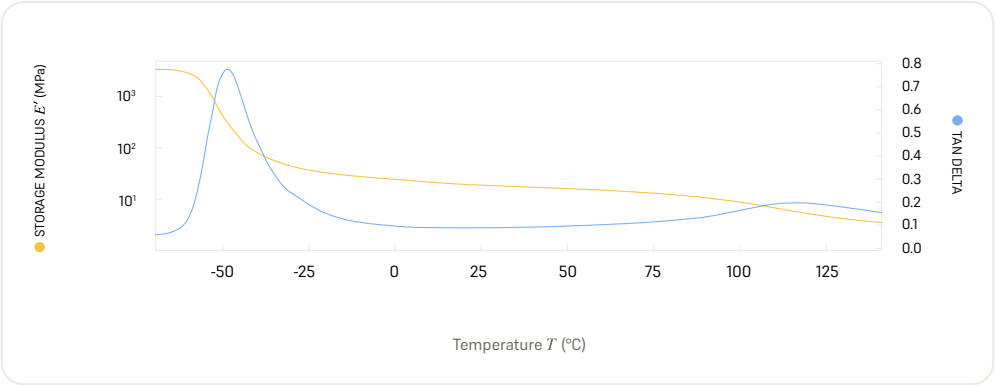
Formlabs evaluated the UV aging performance of Flexible 80A Resin V2 using ASTM D4459 - Sec 7.2.2, a test standard for xenon-arc exposure of plastics for indoor applications. This test simulates polymer aging due to solar radiation exposure through glass. Exposed samples were conditioned for 24 hours at 22 °C before mechanical testing. Control samples were stored at a constant 22 °C. Mechanical testing was conducted according to ASTM D412 at standard lab conditions (22 °C). "0 hrs" represents non-aged samples stored at 22 °C and tested 24 hours after post-processing.

Please note, accelerated weathering testing cannot fully represent all aging conditions. Formlabs recommends conducting additional testing relevant for your specific application needs.



Dynamic Mechanical Analysis (DMA)

A DMA curve of Flex 80A Resin V2 from -70 °C to 140 °C at 2 °C/min is shown. The test used tension mode at 1 Hz and 0.1% strain. A glass transition is observed at -49 °C.



Chemical Compatibility (ASTM D471)

Chemical compatibility is evaluated by measuring the change in physical properties following full immersion in various chemicals according to ASTM D471.

Test specimens are fully immersed for intervals of 1 day and 1 week. ASTM D412 Type C tensile samples are used to measure relative tensile strength and elongation; upon removal from the chemicals, they are washed and conditioned for 24 hours at 22°C prior to mechanical testing per ASTM D412. Rectangular slabs, used for hardness, mass, and volume change, are evaluated immediately after wiping dry without a conditioning period.

Results for tensile properties are reported as relative percentage from the unexposed baseline, hardness change is recorded as an absolute change in points (Shore A) from the unexposed baseline, and mass and volume changes are reported as percentage change from the unexposed baseline.

Solvent	Exposure Time	Relative Change in Hardness (Shore A Points)	Relative Change in Mass (%)	Relative Change in Volume (%)	Relative Elongation (%)	Relative Tensile Strength (%)
Acetone	1 day	-40	+55%	+155%	99%	98%
	1 week	-40	+54%	+147%	103%	92%
Xylene	1 day	-22	+59%	+142%	100%	101%
	1 week	-25	+59%	+175%	112%	105%
IPA	1 day	-32	+45%	+113%	95%	90%
	1 week	-33	+48%	+119%	92%	68%
TPM	1 day	-18	+45%	+93%	52%	18%
	1 week	-28	+55%	+125%	37%	9%
Butyl Acetate	1 day	-23	+57%	+139%	104%	97%
	1 week	-25	+57%	+156%	111%	106%
Ethanol	1 day	-41	+54%	+160%	77%	78%
	1 week	-41	+55%	+153%	76%	62%
Acetic Acid (6%)	1 day	-27	+12%	+7%	95%	92%
	1 week	-27	+14%	+12%	87%	70%
HCl (10%)	1 day	-15	+10%	+6%	93%	78%
	1 week	-30	+19%	+19%	101%	45%
NaOH (10%)	1 day	-14	+6%	+2%	103%	96%
	1 week	-34	+16%	+10%	89%	69%
Bleach (5% NaOCl)	1 day	-14	+7%	+4%	81%	79%
	1 week	N/A[5]	N/A[5]	N/A[5]	N/A[5]	N/A[5]
Hydrogen Peroxide (3%)	1 day	-25	+10%	+6%	100%	95%
	1 week	-28	+10%	+9%	94%	79%
Deionized Water	1 day	-26	+8%	+3%	94%	89%
	1 week	-27	+9%	+7%	101%	88%
Isooctane	1 day	-33	+55%	+122%	99%	94%
	1 week	-34	+56%	+164%	103%	90%
Diesel Fuel	1 day	-7	+27%	+52%	70%	65%
	1 week	-11	+29%	+49%	68%	61%
Motor Oil (5W-30)	1 day	-2	+3%	+1%	101%	87%
	1 week	-1	+3%	+4%	98%	83%
IRM 901 (Oil)	1 day	4	+2%	+0%	101%	90%
	1 week	0	+2%	+2%	103%	91%
IRM 902 (Oil)	1 day	-2	+4%	+4%	88%	84%
	1 week	-2	+7%	+9%	92%	87%
IRM 903 (Oil)	1 day	-1	+8%	+10%	85%	77%
	1 week	-4	+16%	+21%	81%	71%

[5] Material property could not be measured due to specimen degradation.