formlabs

Rigid 10K

Resin for Rigid, Strong, Industrial-Grade Prototypes

This highly glass-filled resin is the stiffest material in our engineering portfolio. Choose Rigid 10K Resin for precise industrial parts that need to withstand significant load without bending. Rigid 10K Resin has a smooth matte finish and is highly resistant to heat and chemicals.

Short-run injection molds and inserts

Heat resistant and fluid exposed components, jigs, and fixtures

Simulates stiffness of glass and fiber-filled thermoplastics

Aerodynamic test models

V1 **FLRG1001**

* **May not be available in all regions**

Prepared 10 . 07 . 2020

Rev. 04 12 . 12 . 2022

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.

	METRIC				METHOD
	Green	**UV Cure [1]**	**UV + Thermal Cure [2]**	**UV Cure + Media Blast**	
Tensile Properties					
Ultimate Tensile Strength	55 MPa	65 MPa	53 MPa	88 MPa	ASTM D638-14
Tensile Modulus	7.5 GPa	10 GPa	10 GPa	11 GPa	ASTM D638-14
Elongation at Break	2%	1%	1%	1.7%	ASTM D638-14
Flexural Properties					
Flexural Strength	84 MPa	126 MPa	103 MPa	158 MPa	ASTM D 790-15
Flexural Modulus	6 GPa	9 GPa	10 GPa	9.9 GPa	ASTM D 790-15
Impact Properties					
Notched Izod	16 J/m	16 J/m	18 J/m	20 J/m	ASTM D256-10
Unnotched Izod	41 J/m	47 J/m	41 J/m	130 J/m	ASTM D4812-11
Thermal Properties					
Heat Deflection Temp. @ 0.45 MPa	65 °C	163 °C	218 °C	238 °C	ASTM D 648-16
Heat Deflection Temp. @ 1.8 MPa	56 °C	82 °C	110 °C	92 °C	ASTM D 648-16
Thermal Expansion, 0-150 °C	48 µm/m/°C	47 µm/m/°C	46 µm/m/°C	41 µm/m/°C	ASTM E 831-13

	IMPERIAL				METHOD
	Green	**UV Cure [1]**	**UV + Thermal Cure [2]**	**UV Cure + Media Blast**	
Tensile Properties					
Ultimate Tensile Strength	7980 psi	9460 psi	7710 psi	12700 psi	ASTM D638-14
Tensile Modulus	1090 ksi	1480 ksi	1460 ksi	1600 ksi	ASTM D638-14
Elongation at Break	2%	1%	1%	1.70%	ASTM D638-14
Flexural Properties					
Flexural Strength	12200 psi	18200 psi	15000 psi	22900 psi	ASTM D 790-15
Flexural Modulus	905 ksi	1360 ksi	1500 ksi	1440 ksi	ASTM D 790-15
Impact Properties					
Notched Izod	0.3 ft-lbf/in	0.3 ft-lbf/in	0.3 ft-lbf/in	0.37 ft-lbf/in	ASTM D256-10
Unnotched Izod	0.8 ft-lbf/in	0.9 ft-lbf/in	0.7 ft-lbf/in	2.5 ft-lbf/in	ASTM D4812-11
Thermal Properties					
Heat Deflection Temp. @ 0.45 MPa	149 °F	325 °F	424 °F	460 °F	ASTM D 648-16
Heat Deflection Temp. @ 1.8 MPa	133 °F	180 °F	230 °F	198 °F	ASTM D 648-16
Thermal Expansion, 0-150 °C	27 µin/in/°F	26 µin/in/°F	26 µin/in/°F	23 µin/in/°F	ASTM E 831-13

Toxic Gas Generation

Testing Standard BSS 7239 (comparable to NFPA No. 258)	Maximum allowed concentration per BSS 7239 (ppm)	Flaming Mode (ppm)	Non-Flaming Mode (ppm)
Hydrogen Cyanide (HCN)	150	1	0.5
Carbon Monoxide (CO)	3500	50	10
Nitrous Oxides (NOx)	100	< 2	< 2
Sulfur Dioxide (SO2)	100	< 1	< 1
Hydrogen Fluoride (HF)	200	< 1.5	< 1.5
Hydrogen Chloride (HCl)	500	1	< 1

Smoke Density / Specific Optical Density

Testing Standard	@ 90 sec	@ 4 min	Maximum
ASTM E662 Flaming Mode	2	95	132
ASTM E662 Non-Flaming Mode	0	1	63

Flammability

Testing Standard	Rating
UL 94 Section 7 (3 mm)	HB

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%	< 0.1	Isooctane (aka gasoline)	0
Acetone	< 0.1	Mineral oil (light)	0.2
Isopropyl Alcohol	< 0.1	Mineral oil (Heavy)	< 0.1
Bleach ~5% NaOCl	0.1	Salt Water (3.5% NaCl)	0.1
Butyl Acetate	0.1	Sodium Hydroxide solution (0.025% PH 10)	0.1
Diesel Fuel	0.1	Water	< 0.1
Diethyl glycol Monomethyl Ether	0.4	Xylene	< 0.1
Hydraulic Oil	0.2	Strong Acid (HCl conc)	0.2
Skydrol 5	0.6	Tripropylene glycol monomethyl ether	0.4
Hydrogen peroxide (3%)	< 0.1		

All testing specimens were printed using Form 3

[1] Data was obtained from parts printed using Form 3, 100 µm and post-cured with a Form Cure for 60 minutes at 70 °C.

[2] Data was obtained from parts printed using Form 3, 100 µm and post-cured with a Form Cure for 60 minutes at 70 °C and an additional thermal cure at 90 °C for 125 minutes.

formlabs

Rigid 4000

Resin for Stiff, Strong, Engineering-Grade Prototypes

Glass-filled Rigid 4000 Resin prints with a smooth, polished finish and is ideal for stiff and strong parts that can withstand minimal deflection. Consider Rigid 4000 Resin for general load-bearing applications.

Mounts and brackets

Jigs and fixtures

Thin-walled parts

Simulates stiffness of PEEK

V1 **FLRGWH01** * **May not be available in all regions**

Prepared 10 . 07 . 2020
Rev. 01 10 . 07 . 2020

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

Rigid 4000 Resin

	METRIC [1]		IMPERIAL [1]		METHOD
	Green [2]	Post-Cured [3]	Green [2]	Post-Cured [3]	
Tensile Properties					
Ultimate Tensile Strength	33 MPa	69 MPa	4786 psi	10007 psi	ASTM D638-14
Tensile Modulus	2.1 GPa	4.1 GPa	305 ksi	595 ksi	ASTM D638-14
Elongation at Break	23%	5.3%	23%	5.3%	ASTM D638-14
Flexural Properties					
Flexural Stress at 5% Strain	43 MPa	105 MPa	6236 psi	15229 psi	ASTM D 790-15
Flexural Modulus	1.4 GPa	3.4 GPa	203 ksi	493 ksi	ASTM D 790-15
Impact Properties					
Notched Izod	16 J/m	23 J/m	0.3 ft-lbf/in	0.43 ft-lbf/in	ASTM D256-10
Thermal Properties					
Heat Deflection Temp. @ 1.8 MPa	41 °C	60 °C	105 °F	140 °F	ASTM D 648-16
Heat Deflection Temp. @ 0.45 MPa	48 °C	77 °C	118 °F	170 °F	ASTM D 648-16
Thermal Expansion (0-150 °C)	64 µm/m/°C	63 µm/m/°C	36 µin/in/°F	35 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 3, 100 µm, Rigid settings, without additional treatments.

[3] Data was obtained from parts printed using Form 3, 100 µm, Rigid settings and post-cured with a Form Cure for 15 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%	0.8	Isooctane (aka gasoline)	< 0.1
Acetone	3.3	Mineral oil (light)	0.2
Isopropyl Alcohol	0.4	Mineral oil (Heavy)	0.2
Bleach ~5% NaOCl	0.7	Salt Water (3.5% NaCl)	0.7
Butyl Acetate	< 0.1	Sodium Hydroxide solution (0.025% PH 10)	0.7
Diesel Fuel	< 0.1	Water	0.7
Diethyl glycol Monomethyl Ether	1.4	Xylene	< 0.1
Hydraulic Oil	0.2	Strong Acid (HCl conc)	5.3
Skydrol 5	1.1		
Hydrogen peroxide (3%)	0.9		

formlabs

Tough & Durable

Materials for Engineering, Manufacturing, and Product Design

Our library of versatile, reliable Tough & Durable Resins is formulated to help you reduce costs, iterate faster, and bring better experiences to market.

*** Please note that resins may not be available in all regions.**

Tough 2000

Stiff, sturdy, rugged prototyping

Tough 1500

Stiff, pliable, resilient prototyping

Durable

Soft, pliable prototyping material

formlabs

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**

Prepared 10 . 07 . 2020
Rev. 01 10 . 07 . 2020

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 Properties					
Flexural Strength	17 MPa	65 MPa	2465 psi	9427 psi	ASTM D 790-15
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
Unnotched Izod	208 J/m	715 J/m	3.9 ft-lbf/in	13 ft-lbf/in	ASTM D4812-11
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	Isooctane (aka gasoline)	< 0.1
Acetone	18.8	Mineral oil (light)	0.1
Isopropyl Alcohol	3.7	Mineral oil (Heavy)	0.2
Bleach ~5% NaOCl	0.6	Salt Water (3.5% NaCl)	0.6
Butyl Acetate	6.2	Sodium Hydroxide solution (0.025% PH 10)	0.6
Diesel Fuel	0.1	Water	0.6
Diethyl glycol Monomethyl Ether	5.3	Xylene	4.1
Hydraulic Oil	< 0.1	Strong Acid (HCl conc)	3.0
Skydrol 5	0.9		
Hydrogen peroxide (3%)	0.6		

formlabs

Tough 1500

Resin for Resilient Prototyping

Tough 1500 Resin is the most resilient material in our functional family of Tough and Durable Resins. This resin 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 and stiffness

Certified biocompatible for extended skin-contact

V1 **FLTO1501** *** May not be available in all regions**

Prepared 10 . 07 . 2020
Rev. 02 05 . 04 . 2021

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 1500 Resin

	METRIC [1]		IMPERIAL [1]		METHOD
	Green [2]	Post-Cured [3]	Green [2]	Post-Cured [3]	
Tensile Properties					
Ultimate Tensile Strength	26 MPa	33 MPa	3771 psi	4786 psi	ASTM D638-14
Tensile Modulus	0.94 GPa	1.5 GPa	136 ksi	218 ksi	ASTM D638-14
Elongation at Break	69%	51%	69%	51%	ASTM D638-14
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 (0-150 °C)	114 µm/m/°C	97 µm/m/°C	63 µin/in/°F	54 µin/in/°F	ASTM E 831-13

Tough 1500 Resin has been evaluated as a **skin contacting device** in accordance with ISO 10993-1, and passed the requirements for the following biocompatibility endpoints:

ISO Standard	Description [4,5]
ISO 10993-5	Not Cytotoxic
ISO 10993-10	Not an Irritant
ISO 10993-10	Not a Sensitizer

[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 1500 settings, without additional treatments.

[3] Data was obtained from parts printed using Form 2, 100 µm, Tough 1500 settings and post-cured with a Form Cure for 60 minutes at 70 °C.

[4] ISO 10993 standard testing samples were printed on a Form 3 with 100um Tough 1500 Resin settings, washed in a Form Wash for 20 minutes in ≥99% Isopropyl Alcohol, dried for at least 30 minutes and post-cured at 70°C for 60 minutes in a Form Cure.

[5] Tough 1500 Resin was tested at NAMSA World Headquarters, OH, USA.

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%)	0.8	Mineral oil (heavy)	< 0.1
Acetone	19.0	Mineral oil (light)	< 0.1
Bleach (5% NaOCl)	0.6	Salt water (3.5% NaCl)	0.7
Butyl acetate	5.0	Skydrol 5	0.5
Diesel	0.1	Sodium Hydroxide solution (0.025% pH=10)	0.7
Diethyl glycol monomethyl ether	5.3	Strong acid (HCl conc)	4.4
Hydraulic oil	0.2	Tripropylene glycol monomethyl ether	0.6
Hydrogen peroxide (3%)	0.7	Water	0.7
Isooctane (aka gasoline)	< 0.1	Xylene	3.2
Isopropyl alcohol	3.2		

formlabs

Durable

Resin for Pliable Prototyping

Durable Resin is the most pliable, impact resistant, and lubricious material in our functional family of Tough and Durable Resins. Choose Durable Resin for squeezable parts and low-friction assemblies.

Squeezable prototypes

Impact resistant jigs

Low friction and non-degrading surfaces

Polyethylene-like strength and stiffness

V2 **FLDUCL02** *** May not be available in all regions**

Prepared 10 . 07 . 2020
Rev. 01 10 . 07 . 2020

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 **Durable Resin**

	METRIC [1]		IMPERIAL [1]		METHOD
	Green [2]	Post-Cured [3]	Green [2]	Post-Cured [3]	
Tensile Properties					
Ultimate Tensile Strength	13 MPa	28 MPa	1900 psi	3980 psi	ASTM D638-14
Tensile Modulus	0.24 GPa	1.0 GPa	34 ksi	149 ksi	ASTM D638-14
Elongation at Break	75%	55%	75%	55%	ASTM D638-14
Flexural Properties					
Flexural Strength	1.0 MPa	24 MPa	149 psi	3420 psi	ASTM D 790-15
Flexural Modulus	0.04 GPa	0.66 GPa	5.58 ksi	94.1 ksi	ASTM D 790-15
Impact Properties					
Notched Izod	127 J/m	114 J/m	2.37 ft-lbf/in	2.13 ft-lbf/in	ASTM D256-10
Unnotched Izod	972 J/m	710 J/m	18.2 ft-lbf/in	13.3 ft-lbf/in	ASTM D4812-11
Thermal Properties					
Heat Deflection Temp. @ 0.45 MPa	< 30 °C	41 °C	< 86 °F	105 °F	ASTM D 648-16
Thermal Expansion (0-150°C)	124 µm/m/°C	106 µm/m/°C	69.1 µin/in/°F	59 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, Durable settings, without additional treatments.

[3] Data was obtained from parts printed using Form 2, 100 µm, Durable settings and post-cured with a Form Cure for 120 minutes at 60 °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%	1.3	Isooctane (aka gasoline)	< 1
Acetone	Sample cracked	Mineral oil (light)	< 1
Isopropyl Alcohol	5.1	Mineral oil (Heavy)	< 1
Bleach ~5% NaOCl	< 1	Salt Water (3.5% NaCl)	< 1
Butyl Acetate	7.9	Sodium Hydroxide solution (0.025% PH 10)	< 1
Diesel Fuel	< 1	Water	< 1
Diethyl glycol monomethyl ether	7.8	Xylene	6.5
Hydraulic Oil	< 1	Strong Acid (HCl conc)	Distorted
Skydrol 5	1.3		
Hydrogen peroxide (3%)	1		

formlabs

Flexible & Elastic

Materials for Engineering, Manufacturing, and Product Design

Our library of versatile, reliable Flexible & Elastic Resins is formulated to help you reduce costs, iterate faster, and bring better experiences to market.

*** Please note that resins may not be available in all regions.**

Flexible 80A

Hard flexible parts with slow return

Elastic 50A

Soft flexible parts that spring back

formlabs

Flexible 80A

Resin for Hard Flexible Prototypes

Flexible 80A Resin is the most stiff soft-touch material in our library of Flexible and Elastic Resins, with an 80A Shore durometer to simulate the flexibility of rubber or TPU.

Balancing softness with strength, Flexible 80A Resin can withstand bending, flexing, and compression, even through repeated cycles. This material is well-suited for cushioning, damping, and shock absorption.

Cartilage and ligament anatomy

Seals, gaskets, masks

Handles, grips, overmolds

V1 **FLFL8001**

* **May not be available in all regions**

Prepared 10 . 07 . 2020
Rev. 01 10 . 07 . 2020

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

Flexible 80A Resin

	METRIC [1]		IMPERIAL [1]		METHOD
	Green	Post-Cured [2]	Green	Post-Cured [2]	
Tensile Properties					
Ultimate Tensile Strength [3]	3.7 MPa	8.9 MPa	539 psi	1290 psi	ASTM D 412-06 (A)
Stress at 50% Elongation	1.5 MPa	3.1 MPa	218 psi	433 psi	ASTM D 412-06 (A)
Stress at 100% Elongation	3.5 MPa	6.3 MPa	510 psi	909 psi	ASTM D 412-06 (A)
Elongation at Break	100%	120%	100%	120%	ASTM D 412-06 (A)
Shore Hardness	70A	80A	70A	80A	ASTM 2240
Compression Set (23 °C for 22 hours)	Not Tested	3%	Not Tested	3%	ASTM D 395-03 (B)
Compression Set (70 °C for 22 hours)	Not Tested	5%	Not Tested	5%	ASTM D 395-03 (B)
Tear Strength [4]	11 kN/m	24 kN/m	61 lbf/in	137 lbf/in	ASTM D 624-00
Ross Flex Fatigue at 23 °C	Not Tested	>200,000 cycles	Not Tested	>200,000 cycles	ASTM D1052, (notched), 60° bending, 100 cycles/minute
Ross Flex Fatigue at -10 °C	Not Tested	>50,000 cycles	Not Tested	>50,000 cycles	ASTM D1052, (notched), 60° bending, 100 cycles/minute
Bayshore Resilience	Not Tested	28%	Not Tested	28%	ASTM D2632
Thermal Properties					
Glass transition temperature (Tg)	Not Tested	27 °C	Not Tested	27 °C	DMA

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

[2] Data was obtained from parts printed using Form 3, 100 µm, Flexible 80A settings, washed in Form Wash for 10 minutes and post-cured with Form Cure at 60 °C for 10 minutes.

[3] Tensile testing was performed after 3+ hours at 23 °C, using a Die C specimen cut from sheets.

[4] Tear testing was performed after 3+ hours at 23 °C, using a Die C tear specimen directly printed.

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%	0.9	Isooctane (aka gasoline)	1.6
Acetone	37.4	Mineral oil (light)	0.1
Isopropyl Alcohol	11.7	Mineral oil (Heavy)	< 0.1
Bleach ~5% NaOCl	0.6	Salt Water (3.5% NaCl)	0.5
Butyl Acetate	51.4	Sodium Hydroxide solution (0.025% PH 10)	0.6
Diesel Fuel	2.3	Water	0.7
Diethyl Glycol Monomethyl Ether	19.3	Xylene	64.1
Hydraulic Oil	1.0	Strong Acid (HCl conc)	28.6
Skydrol 5	10.7	Tripropylene Glycol Methyl Ether (TPM)	13.6
Hydrogen peroxide (3%)	0.7		

formlabs

Elastic 50A

Resin for Soft Flexible Parts

Our softest Engineering Resin, this 50A Shore durometer material is suitable for prototyping parts normally produced with silicone. Choose Elastic Resin for parts that will bend, stretch, compress, and hold up to repeated cycles without tearing.

Compliant features for robotics

Wearables and consumer goods prototyping

Medical models and devices

Special effects props and models

V1 **FLELCL01** *** May not be available in all regions**

Prepared 10 . 07 . 2020
Rev. 01 10 . 07 . 2020

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.

	METRIC [1]		IMPERIAL [1]		METHOD
	Green	Post-Cured [2]	Green	Post-Cured [2]	
Tensile Properties					
Ultimate Tensile Strength [3]	1.61 MPa	3.23 MPa	234 psi	468 psi	ASTM D 412-06 (A)
Stress at 50% Elongation	0.92 MPa	0.94 MPa	133 psi	136 psi	ASTM D 412-06 (A)
Stress at 100% Elongation	1.54 MPa	1.59 MPa	233 psi	231 psi	ASTM D 412-06 (A)
Elongation at Break	100%	160%	100%	160%	ASTM D 412-06 (A)
Tear Strength [4]	8.9 kN/m	19.1 kN/m	51 lbf/in	109 lbf/in	ASTM D 624-00
Shore Hardness	40A	50A	40A	50A	ASTM 2240
Compression Set (23 °C for 22 hours)	2%	2%	2%	2%	ASTM D 395-03 (B)
Compression Set (70 °C for 22 hours)	3%	9%	3%	9%	ASTM D 395-03 (B)

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

[2] Data was obtained from parts printed using Form 2, 100 µm, Elastic settings, washed in Form Wash for 20 minutes and post-cured with Form Cure at 60 °C for 20 minutes.

[3] Tensile testing was performed after 3+ hours at 23 °C, using a Die C dumbbell and 20 in/min cross head speed.

[4] Tear testing was performed after 3+ hours at 23 °C, using a Die C tear specimen and a 20 in/min cross head speed.

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:

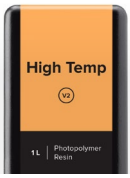
Solvent	24 hr size gain, %	24 hr weight gain, %	Solvent	24 hr size gain, %	24 hr weight gain, %
Acetic Acid 5%	< 1	2.8	Isooctane (aka gasoline)	< 1	3.5
Acetone	19.3	37.3	Mineral oil (light)	< 1	< 1
Isopropyl Alcohol	13.3	25.6	Mineral oil (Heavy)	< 1	< 1
Bleach ~5% NaOCl	< 1	2	Salt Water (3.5% NaCl)	< 1	1.7
Butyl Acetate	18.2	39.6	Sodium Hydroxide solution (0.025% PH 10)	< 1	2
Diesel Fuel	1.2	4.2	Water	< 1	2.3
Diethyl glycol Monomethyl Ether	12	28.6	Xylene	20.4	46.6
Hydraulic Oil	< 1	2.1	Strong Acid (HCl conc)	14.2	39.4
Skydrol 5	9.9	21.7			
Hydrogen peroxide (3%)	< 1	2.2			

formlabs

Specialty

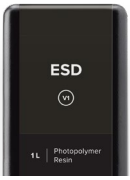
Our family of Specialty Resins features advanced materials with unique properties that expand what's possible with in-house fabrication on our stereolithography 3D printers. These materials may require additional steps, equipment, and experimentation.

*** Please note that resins may not be available in all regions.**



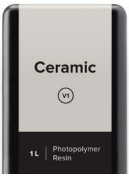
High Temp

High thermal stability



ESD

Rugged ESD-safe material for electronics manufacturing



Ceramic

Experimental ceramic material

formlabs

High Temp

Resin for Heat Resistance

High Temp Resin offers a heat deflection temperature (HDT) of 238 °C @ 0.45 MPa, the highest among Formlabs resins. Use it to print detailed, precise prototypes with high temperature resistance.

Hot air, gas, and fluid flow

Heat resistant mounts, housings, and fixtures

Molds and inserts

V2 **FLHTAM02** *** May not be available in all regions**

Prepared 10 . 07 . 2020
Rev. 01 10 . 07 . 2020

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

High Temp Resin

	METRIC [1]			IMPERIAL [1]			METHOD
	Green [2]	Post-Cured [3]	Post-Cured + additional Thermal Cure [4]	Green [2]	Post-Cured [3]	Post-Cured + additional Thermal Cure [4]	
Tensile Properties							
Ultimate Tensile Strength	21 MPa	58 MPa	49 MPa	3031 psi	8456 psi	7063 psi	ASTM D638-14
Tensile Modulus	0.75 GPa	2.8 GPa	2.8 GPa	109 ksi	399 ksi	406 ksi	ASTM D638-14
Elongation at Break	14%	3.3%	2.3%	14%	3.3%	2.3%	ASTM D638-14
Flexural Properties							
Flexural Strength at Break	24 MPa	95 MPa	97 MPa	3495 psi	13706 psi	14097 psi	ASTM D 790-15
Flexural Modulus	0.7 GPa	2.6 GPa	2.8 GPa	100 ksi	400 ksi	406 ksi	ASTM D 790-15
Impact Properties							
Notched Izod	33 J/m	18 J/m	17 J/m	0.61 ft-lbf/in	0.34 ft-lbf/in	0.32 ft-lbf/in	ASTM D256-10
Thermal Properties							
Heat Deflection Temp. @ 1.8 MPa	44 °C	78 °C	101 °C	111 °F	172 °F	214 °F	ASTM D 648-16
Heat Deflection Temp. @ 0.45 MPa	49 °C	120 °C	238 °C	120 °F	248 °F	460 °F	ASTM D 648-16
Thermal Expansion	118 µm/m/°C	80 µm/m/°C	75 µm/m/°C	41 µin/in/°F	44 µin/in/°F	41 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, High Temp settings, washed for 5 minutes in Form Wash and air dried without post cure.

[3] Data was obtained from parts printed using a Form 2, 100 micron, High Temp settings, and post-cured with Form Cure at 60 °C for 60 minutes.

[4] Data was obtained from parts printed using a Form 2, 100 micron, High Temp settings, and post-cured with Form Cure at 80 °C for 120 minutes plus an additional thermal cure in a lab oven at 160 °C for 180 minutes.

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 size gain, %	24 hr weight gain, %	Solvent	24 hr size gain, %	24 hr weight gain, %
Acetic Acid 5%	< 1	< 1	Mineral oil (Light)	< 1	< 1
Acetone	< 1	2	Mineral oil (Heavy)	< 1	< 1
Bleach ~5% NaOCl	< 1	< 1	Salt Water (3.5% NaCl)	< 1	< 1
Butyl Acetate	< 1	< 1	Skydrol 5	< 1	1.1
Diesel Fuel	< 1	< 1	Sodium Hydroxide solution (0.025% PH 10)	< 1	< 1
Diethyl glycol Monomethyl Ether	< 1	1	Strong Acid (HCl conc)	1.2	< 1
Hydraulic Oil	< 1	< 1	Tripropylene glycol monomethyl ether	< 1	< 1
Hydrogen peroxide (3%)	< 1	< 1	Water	< 1	< 1
Isooctane (aka gasoline)	< 1	< 1	Xylene	< 1	< 1
Isopropyl Alcohol	< 1	< 1			

formlabs

ESD

A rugged ESD-safe material to improve your electronics manufacturing workflows.

Reduce risk and increase manufacturing yield by 3D printing custom tools, jigs, and fixtures with ESD Resin that protect your critical electronics components from static discharge. ESD Resin is a cost-effective solution for producing static-dissipative parts designed to endure use on the factory floor.

Anti-static prototypes and end-use parts

Housings for sensitive electronics

Tooling, jigs, and fixtures for electronics manufacturing

V1 **FLESDS01** * **May not be available in all regions.**

Prepared 12 . 01 . 2021
Rev. **01** 12 . 01 . 2021

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

ESD Resin

	METRIC [1, 2]	IMPERIAL [1,2]	METHOD
	Post-Cured	**Post-Cured**	
Mechanical Properties			
Ultimate Tensile Strength	44.2 MPa	6410 psi	ASTM D 638-14
Tensile Modulus	1.937 GPa	280.9 ksi	ASTM D 638-14
Elongation at Break	12%	12%	ASTM D 638-14
Flexural Properties			
Flexural Strength	61 MPa	8860 psi	ASTM D 790-17
Flexural Modulus	1.841 GPa	267 ksi	ASTM D 790-17
Impact Properties			
Notched Izod	26 J/m	0.489 ft-lbs/in	ASTM D 256-10
Unnotched Izod	277 J/m	5.19 ft-lbs/in	ASTM D 4812-11
Thermal Properties			
Heat Deflection Temp. @ 1.8 MPa	54.2 °C	129.6 °F	ASTM D 648-18
Heat Deflection Temp. @ 0.45 MPa	62.2 °C	143.9 °F	ASTM D 648-18
Thermal Expansion	123.7µm/m/°C	68.7µin/in/°F	ASTM E 813-13
Electrical Properties			
Surface Resistivity	10^5 - 10^8 Ω/sq		ANSI/ESD 11.11 [3]
Volume Resistivity	10^5 - 10^7 Ω-cm		ANSI/ESD 11.11 [3]
Physical Properties			
Density	1.116 g/cm^3	69.67 lbs/ft^3	ASTM D792
Hardness	90 Shore D		ASTM D2240

[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 measured on Type IV tensile bars printed on a Form 3 printer with 100 µm ESD Resin settings, washed in a Form Wash for 20 minutes in ≥99% Isopropyl Alcohol, and post-cured at 70°C for X 60 minutes in a Form Cure.

[3] ESD Resin was tested at ETS 700 West Park Avenue, Perkasie, PA 18944.

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%	0.5	Mineral oil, heavy	0.1
Acetone	13.1	Mineral oil, light	0.1
Bleach ~5% NaOCl	0.5	Salt Water (3.5% NaCl)	0.6
Butyl Acetate	3.8	Skydrol 5	0.5
Diesel Fuel	0.2	Sodium hydroxide solution (0.025% pH = 10)	0.7
Diethyl glycol monomethyl ether	3.6	Strong Acid (HCl Conc)	1.4
Hydraulic Oil	0.2	TPM	0.6
Hydrogen peroxide (3%)	0.6	Water	0.7
Isooctane	< 0.1	Xylene	1.60
Isopropyl Alcohol	2.6		

formlabs

Ceramic

An Experimental Material for Engineering, Art, and Design

Parts 3D printed in silica-filled Ceramic Resin can be fired to create a fully ceramic piece. This experimental Form X material requires more trial and error than other Formlabs products. Please read the usage guide prior to printing.

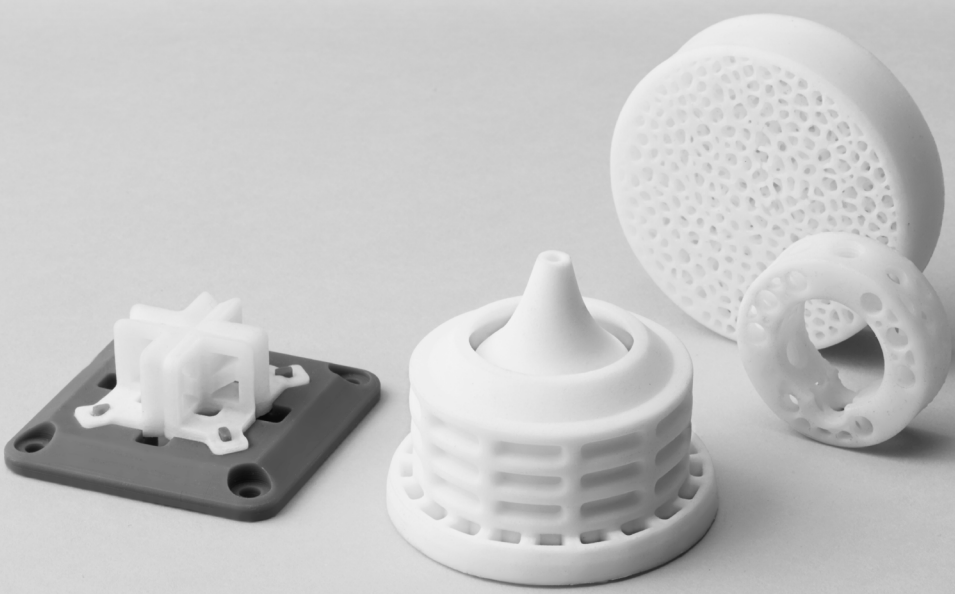
Available only for the Form 2.

Technical experimentation

Research and development

Fine art and sculpture

Jewelry



V1 **FLCEWH01** *** May not be available in all regions**

Prepared 05 . 03 . 2018
Rev. 01 05 . 03 . 2018

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.

	METRIC [1]		IMPERIAL [1]		METHOD
	Green [2]	**Fired [3]**	**Green [2]**	**Fired [3]**	
Tensile Properties					
Ultimate Tensile Strength	5.1 MPa	N/A	740 psi	N/A	ASTM D638-14
Tensile Modulus	1 GPa	5.1 GPa	149 ksi	740 ksi	ASTM D638-14
Elongation	1.4%	N/A	1.4%	N/A	ASTM D638-14
Flexural Properties					
Flexural Stress at Break	10.3 MPa	10.3 MPa	1489 psi	1489 psi	ASTM D790-15e2
Flexural Modulus	995 MPa	N/A	144 ksi	N/A	ASTM D790-15e2
Impact Properties					
Notched Izod	18.4 J/m	N/A	0.35 ft-lb/in	N/A	ASTM D256-10e1
Thermal Properties					
Heat Deflection Temp. @ 1.8 MPa	75 °C	75 °C	155 °F	155 °F	ASTM D648-16, Method B
Heat Deflection Temp. @ 0.45 MPa	> 290 °C	> 290 °C	> 554 °F	> 554 °F	ASTM D648-16, Method B

[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, Ceramic settings, washed, air dried, and post-cured in Form Cure at 60 °C for 60 minutes.

[3] Data was obtained from fired parts, printed using Form 2, 100 µm, Ceramic settings, which were washed, dried and post-cured in Form Cure at 60 °C for 60 minutes. Parts had been printed with a pre-applied scale factor and fired using an 30 hr schedule to a maximum firing temperature of 1275 °C as laid out in the Formlabs usage guide.

formlabs

Polyurethane

Materials for Engineering, Manufacturing, and Product Design

Our library of versatile, reliable polyurethane resins is formulated to help you reduce costs, iterate faster, and bring better experiences to market.

*** Please note that resins may not be available in all regions.**

PU Rigid 1000

Stiff, Sturdy, and Unyielding Polyurethane Parts

PU Rigid 650

Impact Resistant and Pliable Polyurethane Parts

Rebound

Highly resilient end-use TPU material

formlabs

PU Rigid 1000

For Stiff, Sturdy, and Unyielding Polyurethane Parts

PU Rigid 1000 Resin is a semi-rigid and tough polyurethane material that can handle high impacts and harsh environments repeatedly.

Protective casings, housings, and enclosures

Static jigs and fixtures undergoing high-stress

Sturdy consumer products

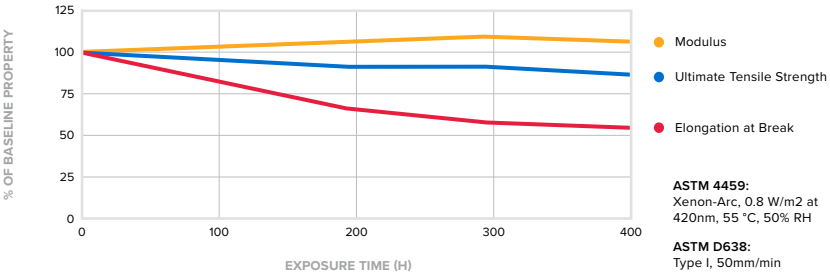
V1 **FLPU1001** *** May not be available in all regions**

Prepared 04 . 28 . 2022
Rev. 01 04 . 28 . 2022

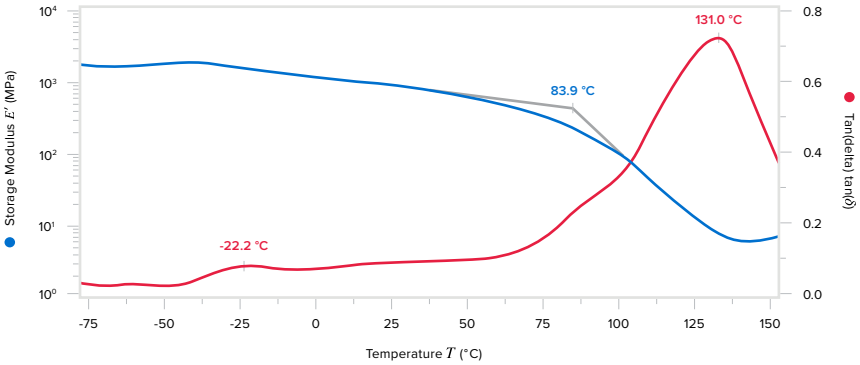
To the best of our knowledge the information contained herein is accurate. However, Formlabs, Inc. makes no warranty, expressed or implied, regarding the accuracy of these results to be obtained from the use thereof.

	METRIC [1]	IMPERIAL [1]	METHOD
	Post-Cured [2]	**Post-Cured [2]**	
Tensile Properties			
Ultimate Tensile Strength	35 ± 3.5 MPa	5 ± 0.5 ksi	ASTM D638
Young's Modulus	0.92 ± 0.09 GPa	133 ± 13 ksi	ASTM D638
Elongation at Break	80 ± 8%	80 ± 8%	ASTM D638
Flexural Properties			
Flexural Strength	32 ± 1.6 MPa	4.6 ± 0.2 ksi	ASTM D 790-15
Flexural Modulus	0.75 ± 0.03 GPa	109 ± 4.4 ksi	ASTM D 790-15
Ross Flexing Fatigue (unnotched)	> 50,000 cycles (PASS-no crack propagation)		ASTM D 1052 (23 °C)
Impact Properties			
Notched Izod	170 J/m	3.18 ft-lbs/in	ASTM D 256-10
Charpy Impact Test (Notched)	23 kJ/m^2	11 $ft\text{-}lbs/in^2$	ISO 179-1:2010(E)
Tabor Abrasion	177 mm^3	0.01 in^3	ISO 4649 (40rpm, 10N load)
Physical Properties			
Hardness	74D		ASTM D 2240
Density (solid)	1.16 g/cm^3	72.42 lb/ft^3	ASTM D 792-20
Viscosity (@ 25 °C)	1193 cP		
Viscosity (@ 35 °C)	567 cP		
Thermal Properties			
Heat Deflection Temp. @ 1.8 MPa	64 °C	147 °F	ASTM D 648-16
Heat Deflection Temp. @ 0.45 MPa	79 °C	174 °F	ASTM D 648-16
Thermal Expansion	142 µm/m/°C	78.9 µin/in/°F	ASTM E 813-13
Glass Transition Temperature (Tg1)	-22 °C	-8 °F	DMA*
Glass Transition Temperature (Tg2)	131 °C	268 °F	DMA*
Electrical Properties			
Dielectric Strength	1.8 x 10^7 V/m	460 V/mil	ASTM D149-20
Dielectric Constant	3.9		ASTM D 150, 0.5 MHz
Dielectric Constant	4.3		ASTM D 150, 1.0 MHz
Dissipation Factor	0.077		ASTM D 150, 0.5 MHz
Dissipation Factor	0.081		ASTM D 150, 1.0 MHz
Volume resistivity	6.5 x 10^{11} ohm-cm	2.56 x 10^{11} ohm-in	ASTM D257-14
Flammability Properties			
Flammability rating	HB		UL 94
Smoke Density	(D s 1.5) = 31 (PASS) (D s 4.0) = 244 (FAIL)		ASTM E662-21
Automotive Specific Testing			
Volatile Organic Compounds	199 µg/g	0.03 oz/lb	VOC VDA 278
Fogging	3.2 mg	1.1 x 10^{-4} oz	DIN 75201, Method B

Accelerated Aging



Dynamic mechanical analysis (DMA) is used to study the viscoelastic behavior of materials. Below is the DMA thermogram for PU Rigid 1000. Storage modulus and tan(delta) are plotted as function of temperature. Two glass transition temperatures are observed for PU Rigid 1000, which are -22.2°C and +131.0°C. A drop in storage modulus, indicating softening, is observed around 80°C.



PU R1000 Resin has been evaluated as a **skin contacting device** in accordance with ISO 10993-1, and passed the requirements for the following biocompatibility endpoints:

ISO Standard	Description [3, 4]
EN ISO 10993-5	Not cytotoxic
EN ISO 10993-10	Not an irritant
EN ISO 10993-10	Not a sensitizer

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%	0.4	Isopropyl Alcohol	1.7
Acetone	11.0	Castor Oil	< 0.1
Bleach ~5% NaOCl	0.3	Mineral oil, light	< 0.1
Butyl Acetate	3.5	Propylene Glycol Diacetate	0.1
Dichloromethane	95.9	Salt Water (3.5% NaCl)	0.2
Diesel Fuel	< 0.1	Skydrol 500B-4	0.2
Diethyl glycol monomethyl ether	3.5	Sodium hydroxide solution (0.025% pH = 10)	0.3
Gasoline	< 0.1	Strong Acid (HCl Conc)	-1.1
Hexane	< 0.1	Water	0.2
Hydraulic Oil	< 0.1	Xylene	2.7
Hydrogen peroxide (3%)	0.3		

[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 measured on Type I tensile bars printed on a Form 2 printer with 100 µm PU R1000 Resin settings, washed in a Form Wash for 2 minutes in ≥99% PGDA, and post-cured.

[3] ISO 10993 standard testing samples were printed on a Form 3 with 100um PU Rigid 1000 Resin settings, washed in a Form Wash for 5 minutes in ≥99% PGDA, dried for at least 24 hours and post-cured at 46°C and 70%RH for 3 days in an oven.

[4] PU R1000 Resin was tested at NAMSA World Headquarters, OH, USA.

formlabs

PU Rigid 650

For Impact Resistant and Semi-Stiff Polyurethane Parts

PU Rigid 650 Resin is a tough and pliable polyurethane material that can withstand extreme impacts while maintaining true shape long-term.

Impact-resistant components

Pliable mechanical connectors

Shock-absorbing bumpers and dampeners

Noise-dampening components

V1 **FLPU6501** *** May not be available in all regions**

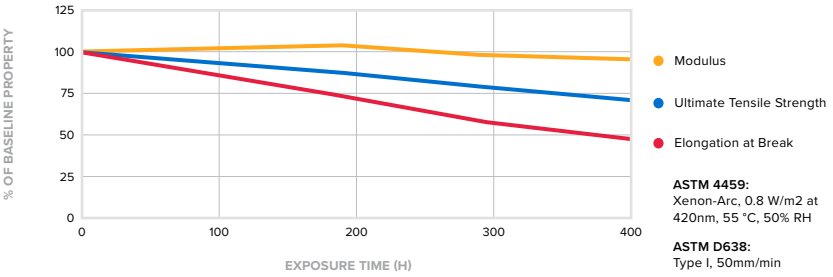
Prepared 05 . 03 . 2022

Rev. 01 05 . 03 . 2022

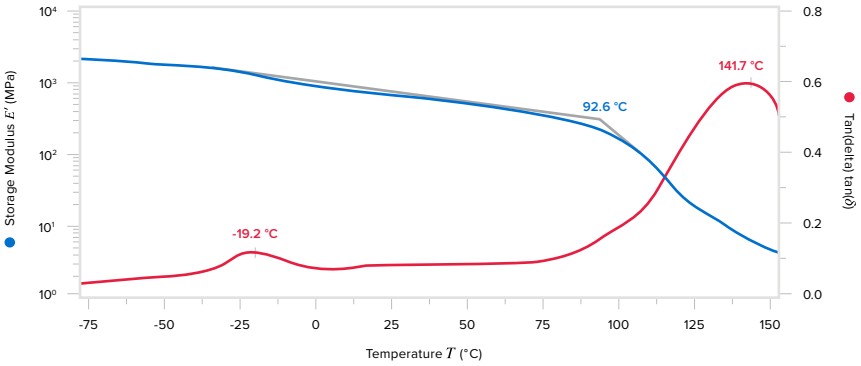
To the best of our knowledge the information contained herein is accurate. However, Formlabs, Inc. makes no warranty, expressed or implied, regarding the accuracy of these results to be obtained from the use thereof.

	METRIC [1]	IMPERIAL [1]	METHOD
	Post-Cured [2]	**Post-Cured [2]**	
Tensile Properties			
Ultimate Tensile Strength	34 ± 3.4 MPa	5 ± 0.5 ksi	ASTM D638
Young's Modulus	0.67 ± 0.06 GPa	97 ± 9 ksi	ASTM D638
Elongation at Break	170 ± 17 %	170 ± 17 %	ASTM D638
Flexural Properties			
Flexural Strength	22 ± 1.1 MPa	3.2 ± 0.2 ksi	ASTM D 790-15
Flexural Modulus	0.57 ± 0.03 GPa	83 ± 4 ksi	ASTM D 790-15
Ross Flexing Fatigue (unnotched)	> 50,000 cycles (PASS-no crack propagation)		ASTM D 1052 (-10 °C)
Ross Flexing Fatigue (unnotched)	> 50,000 cycles (PASS-no crack propagation)		ASTM D 1052 (23 °C)
Impact Properties			
Notched Izod	375 J/m	7.0 ft-lbs/in	ASTM D 256-10
Charpy Impact Test (Notched)	44 kJ/m^2	21 $ft\text{-}lbs/in^2$	ISO 179-1:2010(E)
Tabor Abrasion	101 mm^3	6.2 x 10-3 in^3	ISO 4649 (40rpm, 10N load)
Physical Properties			
Hardness	64D		ASTM D 2240
Density (solid)	1.16 g/cm^3	72.42 lb/ft^3	ASTM D 792-20
Viscosity (@ 25 °C)	1070 cP		
Viscosity (@ 35 °C)	519 cP		
Thermal Properties			
Heat Deflection Temp. @ 1.8 MPa	59 °C	138 °F	ASTM D 648-16
Heat Deflection Temp. @ 0.45 MPa	82 °C	179 °F	ASTM D 648-16
Thermal Expansion	130.4 µm/m/°C	72.4 µin/in/°F	ASTM E 813-13
Glass Transition Temperature (Tg1)	-19 °C	-2 °F	DMA*
Glass Transition Temperature (Tg2)	142 °C	286 °F	DMA*
Electrical Properties			
Dielectric Strength	1.8 x 10^7 V/m	460 V/mil	ASTM D149-20
Dielectric Constant	4.3		ASTM D 150, 0.5 MHz
Dielectric Constant	4.7		ASTM D 150, 1.0 MHz
Dissipation Factor	0.088		ASTM D 150, 0.5 MHz
Dissipation Factor	0.088		ASTM D 150, 1.0 MHz
Volume resistivity	4.7x 10^{11} ohm-cm	1.9 x 10^{11} ohm-in	ASTM D257-14
Flammability Properties			
Flammability rating	HB		UL 94
Smoke Density	(D s 1.5) = 15 (PASS) (D s 4.0) = 262 (FAIL)		ASTM E662-21
Automotive Specific Testing			
Volatile Organic Compounds	444 µg/g	0.07 oz/lb	VOC VDA 278
Fogging	10.7 mg	3.8 x 10^{-4} oz	DIN 75201, Method B

Accelerated Aging



Dynamic mechanical analysis (DMA) is used to study the viscoelastic behavior of materials. Below is the DMA thermogram for PU Rigid 650. Storage modulus and tan(delta) are plotted as function of temperature. Two glass transition temperatures are observed for PU Rigid 1000, which are -19.2°C and +141.7°C. A drop in storage modulus, indicating softening, is observed around 90°C.



PU Rigid 650 Resin has been evaluated as a **skin contacting device** in accordance with ISO 10993-1, and passed the requirements for the following biocompatibility endpoints:

ISO Standard	Description [3, 4]
EN ISO 10993-5	Not cytotoxic
EN ISO 10993-10	Not an irritant
EN ISO 10993-10	Not a sensitizer

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%	0.4	Isopropyl Alcohol	1.3
Acetone	8.9	Castor Oil	< 0.1
Bleach ~5% NaOCl	< 0.1	Mineral oil, light	< 0.1
Butyl Acetate	2.6	Propylene Glycol Diacetate	0.7
Dichloromethane	116.1	Salt Water (3.5% NaCl)	0.3
Diesel Fuel	< 0.1	Skydrol 500B-4	0.1
Diethyl glycol monomethyl ether	2.7	Sodium hydroxide solution (0.025% pH = 10)	0.2
Gasoline	< 0.1	Strong Acid (HCl Conc)	-3.0
Hexane	< 0.1	Water	0.3
Hydraulic Oil	< 0.1	Xylene	2.0
Hydrogen peroxide (3%)	0.2		

[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 measured on Type IV tensile bars printed on a Form 2 printer with 100 µm PU Rigid 650 Resin settings, washed in a Form Wash for 2 minutes in ≥99% PGDA, and post-cured.

[3] ISO 10993 standard testing samples were printed on a Form 3 with 100um PU Rigid 650 Resin settings, washed in PGDA for 5 minutes, dried for at least 24 hours and cured at 46°C at 70% RH for 3 day in an oven.

[4] PU Rigid 650 Resin was tested at NAMSA World Headquarters, OH, USA.

formlabs

Rebound

Production-Ready Elastic 3D Printing Material Resin

With five times the tear strength, three times the tensile strength, and two times the elongation of other production-grade elastomeric materials on the market, Rebound Resin is perfect for 3D printing springy, resilient parts.

End-use production

Gaskets, seals, and grommets

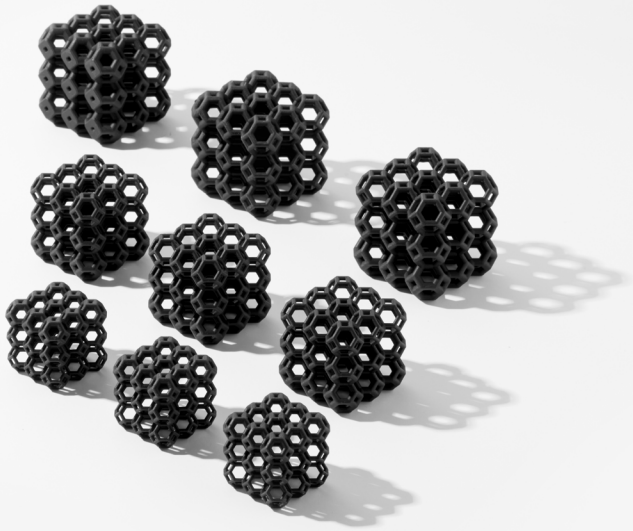
Compliant robotics

Custom cases

Handles, grips, and overmolds

Complex geometries

This material is available exclusively through partnership with Formlabs and requires a minimum quantity commitment to get started. After you contact us, you'll have the opportunity to request a standard sample, purchase a run of custom samples to evaluate, and finally, buy a turnkey package of the equipment needed to print in Rebound Resin at your facility.



V1 **FLRBBL01** *** May not be available in all regions**

Prepared 03 . 18 . 2020
Rev. 01 03 . 18 . 2020

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

Rebound Resin

	METRIC [1]	IMPERIAL [1]	METHOD
	Post-Cured	**Post-Cured**	
Tensile Properties			
Ultimate Tensile Strength	22 MPa	3,391 psi	ASTM D 412-06 (A)
Modulus at 50% Elongation	3.46 MPa	501.83 psi	ASTM D 412-06 (A)
Elongation at Break	300%	300%	ASTM D 412-06 (A)
Compression set at 25 °C for 22 hrs	16%	16%	ASTM D 395-03 (B)
Compression set at 70 °C for 22 hrs	40%	40%	ASTM D 395-03 (B)
Tear Strength	110 kN/m	628 lbf/in	ASTM D 624-00
Hardness, Shore A	86A	86A	ASTM D 2633
Bayshore Rebound Resilience	57%	57%	ASTM D 2633
Abrasion	101 mm^3	101 mm^3	ISO 4649, 40 rpm, 10 N load
Ross Flexing Fatigue (23 °C)	> 50,000 cycles (no crack propagation)	> 50,000 cycles (no crack propagation)	ASTM D1052, (notched), 23 °C, 60 degree bending, 100 cycles/minute
Ross Flexing Fatigue (-10 °C)	> 50,000 cycles (no crack propagation)	> 50,000 cycles (no crack propagation)	ASTM D1052, (notched), -10 °C, 60 degree bending, 100 cycles/minute
Dielectric Properties			
Dielectric Constant	7.7	7.7	ASTM D150, 1MHz
Dissipation Factor	0.069	0.069	ASTM D150, 1MHz
Thermal Properties			
Glass Transition Temperate	-50 °C	-58 °F	DSC

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

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, %
Water	9	Dichloromethane	367
Salt Water	7	Propylene Glycol Diacetate	9
Isopropyl Alcohol	8	Diethylene Glycol Monomethyl Ether	16
Acetone	37	Mineral Oil (Light)	< 1.0
Hexane	1	Castor Oil	< 1.0
Butyl Acetate	26	Hydraulic Oil	< 1.0