Formlabs Materials Library

Advanced materials designed to deliver beautiful results.

Prepared 02 . 26 . 2018

formlabs

Materials Overview

RESIN	100 µm	50 µm	25 µm	FEATURES & APPLICATIONS	
Standard					
Clear	✓	✓	✓	• Polishes to transparency • Internal channels	• Working with light • Semi-gloss surface
White	✓	✓		• Opaque • Matte surface	• Great for large, smooth surfaces
Grey	✓	✓	✓	• Opaque • Matte surface	• Show details well without primer
Black	✓	✓	✓	• Opaque • Matte Surface	• Show details well without primer
Color Kit	✓	✓	✓	• Opaque • Matte Surface	• Colorful parts without requiring painting
Engineering					
Grey Pro	✓	✓		• Form and fit testing • Mold masters for plastics and silicones	• Snap fits • Jigs and fixtures for manufacturing
Rigid	✓	✓		• Thin wall parts • Jigs, fixtures, and tooling	• Electrical casings and automotive housings • Turbines and fan blades
Tough	✓	✓		• Thicker-walled casings • Rugged prototypes	• Assemblies • Interference and press fits
Durable	✓	✓		• Prototyping consumer packaging • Bushings and bearings	• Threading • Living hinges
Flexible	✓	✓		• Handles, grips and overmolds • Cushioning and dampening	• Wearables prototyping
High Temp	✓	✓	✓	• Mold prototyping • Heat-resistant fixtures	• Low pressure fluidics • Environmental testing
Dentistry					
Dental SG		✓		• Class 1 biocompatible material	• Prints surgical and pilot drill guides
Dental Model	✓	✓	✓	• Matte surface • Prints crown and bridge models with removable dies	• Contacts within ± 35 µm • Crisp margins
Dental LT Clear		✓		• Class 2 biocompatible material	• Polishes to high optical transparency • Prints splints, retainers, and other orthodontic devices
Jewelry					
Castable	✓	✓	✓	• Burns out cleanly • Captures fine detail	• Designed for Investment Casting

MATERIAL DATA SHEET

Standard

Materials for High-Resolution Rapid Prototyping

High Resolution. For demanding applications, our carefully-engineered resins capture the finest features in your model.

Strength and Precision. Our resins create accurate and robust parts, ideal for rapid prototyping and product development.

Surface Finish. Perfectly smooth right out of the printer, parts printed on the Form 2 printer have the polish and finish of a final product.

CLEAR
FLGPCL04

WHITE
FLGPWH04

GREY
FLGPGR04

BLACK
FLGPBL04

COLOR
FLGPCB01

Prepared 04 . 19 . 2016
Rev 01 04 . 18 . 2017

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

The following material properties are comparable for all our Standard Resins.

	METRIC[1]		IMPERIAL[1]		METHOD
	Green[2]	Post-Cured[3]	Green[2]	Post-Cured[3]	
Tensile Properties					
Ultimate Tensile Strength	38 MPa	65 MPa	5510 psi	9380 psi	ASTM D 638-10
Tensile Modulus	1.6 GPa	2.8 GPa	234 ksi	402 ksi	ASTM D 638-10
Elongation at Failure	12 %	6.2 %	12 %	6.2 %	ASTM D 638-10
Flexural Properties					
Flexural Modulus	1.25 GPa	2.2 GPa	181 ksi	320 ksi	ASTM C 790-10
Impact Properties					
Notched IZOD	16 J/m	25 J/m	0.3 ft-lbf/in	0.46 ft-lbf/in	ASTM D 256-10
Temperature Properties					
Heat Deflection Temp. @ 264 psi	42.7 °C	58.4 °C	108.9 °F	137.1 °F	ASTM D 648-07
Heat Deflection Temp. @ 66 psi	49.7 °C	73.1 °C	121.5 °F	163.6 °F	ASTM D 648-07

[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, Clear settings, without additional treatments.

[3] Data was obtained from parts printed using Form 2, 100 µm, Clear settings, and post-cured with 1.25 mW/cm^2 of 405 nm LED light for 60 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 Hour Weight Gain (%)	Solvent	24 Hour Weight Gain (%)
Acetic Acid, 5 %	< 1	Hydrogen Peroxide (3 %)	< 1
Acetone	sample cracked	Isooctane	< 1
Isopropyl Alcohol	< 1	Mineral Oil, light	< 1
Bleach, ~5 % NaOCl	< 1	Mineral Oil, heavy	< 1
Butyl Acetate	< 1	Salt Water (3.5 % NaCl)	< 1
Diesel	< 1	Sodium hydroxide (0.025 %, pH = 10)	< 1
Diethyl glycol monomethyl ether	1.7	Water	< 1
Hydrolic Oil	< 1	Xylene	< 1
Skydrol 5	1	Strong Acid (HCl Conc)	distorted

HIGH RESOLUTION

For demanding applications, our carefully-engineered resins capture the finest features in your model.

STRENGTH AND PRECISION

Our resins create accurate and robust parts, ideal for our rapid prototyping and product development.

SURFACE FINISH

Perfectly smooth right out of the printer, parts printed on the Form 2 printer have the polish and finish of a final product.

CLEAR

Our Clear Resin polishes to near optical transparency, making it ideal for showcasing internal features.

WHITE

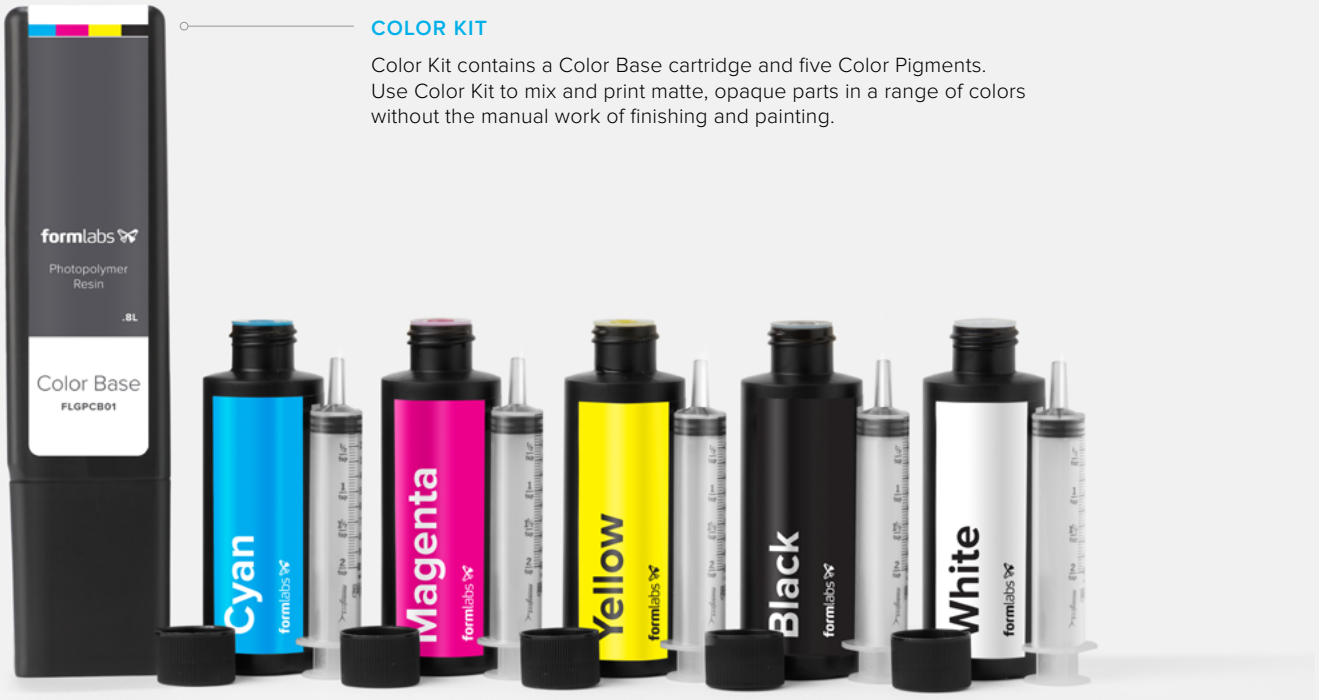
Our White Resin emphasizes fine details and has a matte finish with a warm, slightly ivory color.

GREY

Our Grey Resin has a smooth, matte finish and shows details beautifully without primer.

BLACK

Our Black Resin's opaque matte finish rivals the look of injection-molded plastics, capable of producing incredible looks-like prototypes.



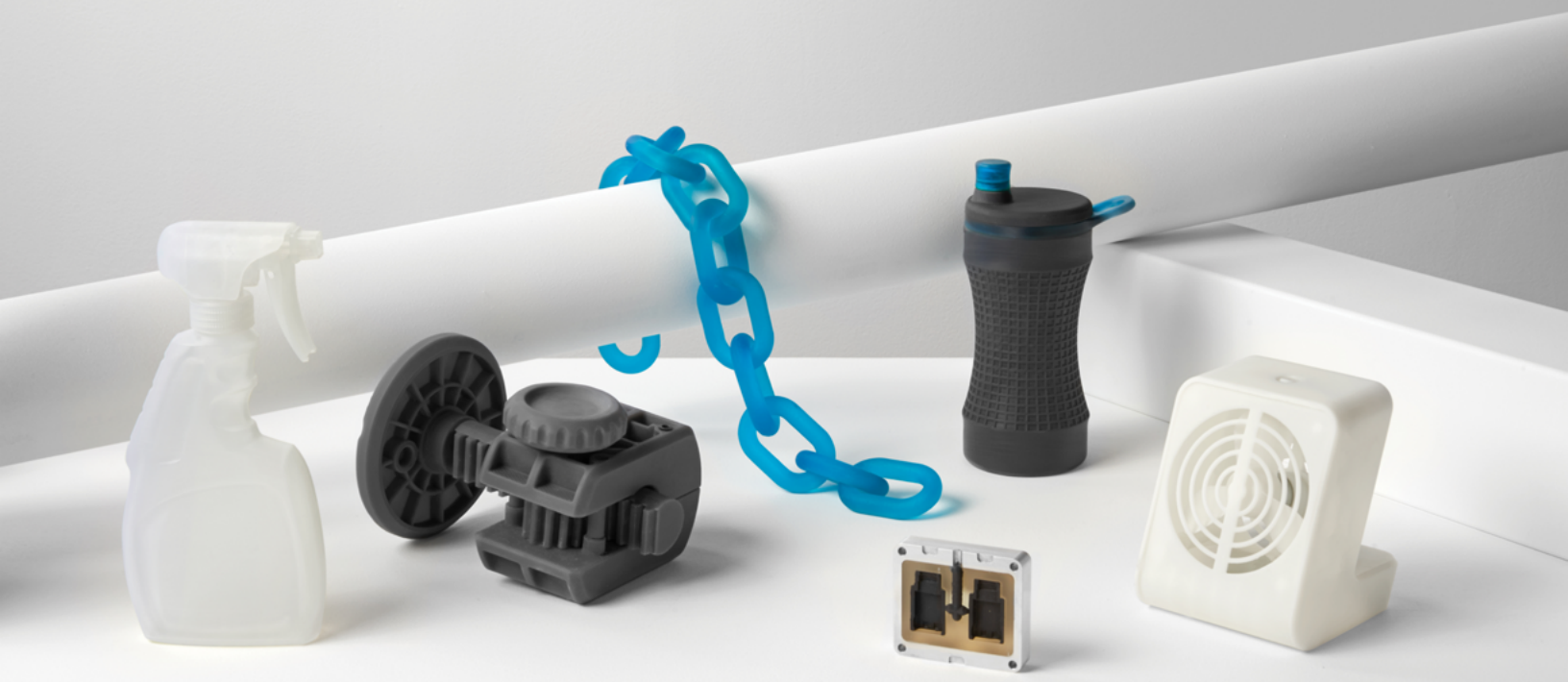
COLOR KIT

Color Kit contains a Color Base cartridge and five Color Pigments. Use Color Kit to mix and print matte, opaque parts in a range of colors without the manual work of finishing and painting.

Engineering

Materials for Engineering, Manufacturing, and Product Design

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



GREY PRO
FLPRGR01

RIGID
FLRGWH01

DURABLE
FLDUCL02

TOUGH
FLTOTL05

FLEXIBLE
FLFLGR02

HIGH TEMP
FLHTAM01

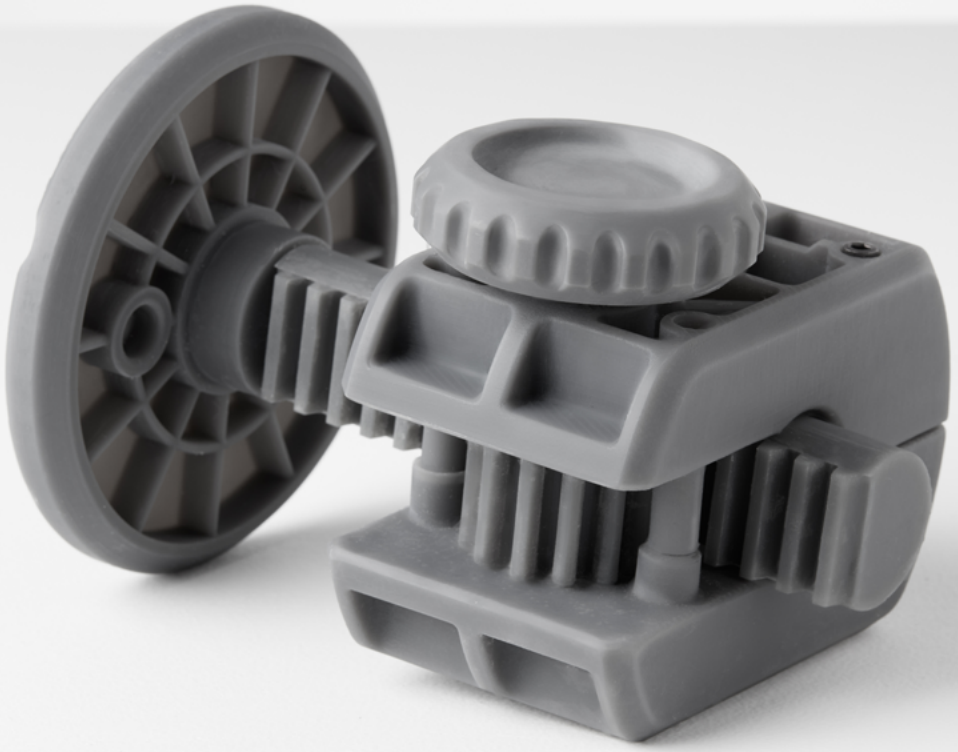
ENGINEERING RESIN

Grey Pro

Grey Pro Resin for Versatile Prototyping

Grey Pro Resin offers high precision, moderate elongation, and low creep. This material is great for concept modeling and functional prototyping, especially for parts that will be handled repeatedly. Requires Resin Tank LT.

- Form and fit testing
- Injection molded product prototypes
- Mold masters for plastics, and silicones
- Jigs and fixtures for manufacturing



FLPRGR01

Prepared 01 . 22 . 2018
Rev 01 01 . 22 . 2018

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Material Properties Data

	METRIC[1]		IMPERIAL[1]		METHOD
	Green[2]	Post-Cured[3]	Green[2]	Post-Cured[3]	
Tensile Properties					
Ultimate Tensile Strength	35 MPa	61 MPa	5076 psi	8876 psi	ASTM D 638-14
Tensile Modulus	1.4 GPa	2.6 GPa	203 ksi	377 ksi	ASTM D 638-14
Elongation	32.5 %	13 %	32.5 %	13 %	ASTM D 638-14
Flexural Properties					
Flexural Stress at 5% Strain	39 MPa	86 MPa	5598 psi	12400 psi	ASTM D 790-15
Flexural Modulus	0.94 GPa	2.2 GPa	136 ksi	319 ksi	ASTM D 790-15
Impact Properties					
Notched IZOD	not tested	18.7 J/m	not tested	0.351 ft-lbf/in	ASTM D256-10
Temperature Properties					
Heat Deflection Temp. @ 1.8 MPa	not tested	62.4 C	not tested	144.3 °F	ASTM D 648-16
Heat Deflection Temp. @ 0.45 MPa	not tested	77.5 C	not tested	171.5 °F	ASTM D 648-16
Thermal Expansion (-30 to 30° C)	not tested	78.5 um/m/C	not tested	43.4 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, Grey Pro settings, without additional treatments.

[3] Data was obtained from parts printed using Form 2, 100 µm, Grey Pro 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 Hour Weight Gain (%)	Solvent	24 Hour Weight Gain (%)
Acetic Acid, 5 %	0.75	Hydrogen Peroxide (3 %)	0.75
Acetone	10.77	Isooctane	0.02
Isopropyl Alcohol	1.56	Mineral Oil, light	0.35
Bleach, ~5 % NaOCl	0.65	Mineral Oil, heavy	0.27
Butyl Acetate	0.84	Salt Water (3.5 % NaCl)	0.64
Diesel	0.08	Sodium hydroxide (0.025 %, pH = 10)	0.72
Diethyl glycol monomethyl ether	2.38	Water	0.83
Hydrolic Oil	0.16	Xylene	0.42
Skydrol 5	0.54	Strong Acid (HCl Conc)	8.21

ENGINEERING RESIN

Rigid

Rigid Resin for Stiffness and Precision

Rigid Resin is reinforced with glass to offer very high stiffness and a polished finish. This material is highly resistant to deformation over time and is great for printing thin walls and features. Requires Resin Tank LT.

- Turbines and fan blades
- Manifolds
- Jigs, fixtures, and tooling
- Electrical casings and automotive housings

FLRGWH01

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Prepared 01 . 23 . 2018
Rev 01 01 . 23 . 2018

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Material Properties Data

	METRIC[1]		IMPERIAL[1]		METHOD
	Green[2]	Post-Cured[3]	Green[2]	Post-Cured[3]	
Tensile Properties					
Ultimate Tensile Strength	40 MPa	75 MPa	5801 psi	10907 psi	ASTM D 638-14
Tensile Modulus	2.2 GPa	4.1 GPa	319 ksi	594 ksi	ASTM D 638-14
Elongation	13.3 %	5.6 %	13.3 %	5.6 %	ASTM D 638-14
Flexural Properties					
Flexural Stress at 5% Strain	49 MPa	121 MPa	7135 psi	17593 psi	ASTM D 790-15
Flexural Modulus	1.37 GPa	3.7 GPa	198 ksi	537 ksi	ASTM D 790-15
Impact Properties					
Notched IZOD	not tested	18.8 J/m	not tested	0.37 ft-lbf/in	ASTM D256-10
Temperature Properties					
Heat Deflection Temp. @ 1.8 MPa	not tested	74 °C	not tested	165.2 °F	ASTM D 648-16
Heat Deflection Temp. @ 0.45 MPa	not tested	88 °C	not tested	190.4 °F	ASTM D 648-16
Thermal Expansion (-30 to 30° C)	not tested	53 µm/m/°C	not tested	29.5 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, Rigid settings, without additional treatments.

[3] Data was obtained from parts printed using Form 2, 100 µm, Rigid 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 Hour Weight Gain (%)	Solvent	24 Hour Weight Gain (%)
Acetic Acid, 5 %	0.8	Hydrogen Peroxide (3 %)	0.87
Acetone	3.27	Isooctane	0.05
Isopropyl Alcohol	0.38	Mineral Oil, light	0.22
Bleach, ~5 % NaOCl	0.69	Mineral Oil, heavy	0.15
Butyl Acetate	0.09	Salt Water (3.5 % NaCl)	0.71
Diesel	0.06	Sodium hydroxide (0.025 %, pH = 10)	0.68
Diethyl glycol monomethyl ether	1.37	Water	0.7
Hydrolic Oil	0.17	Xylene	0.09
Skydrol 5	1.11	Strong Acid (HCl Conc)	5.34

ENGINEERING RESIN

Tough

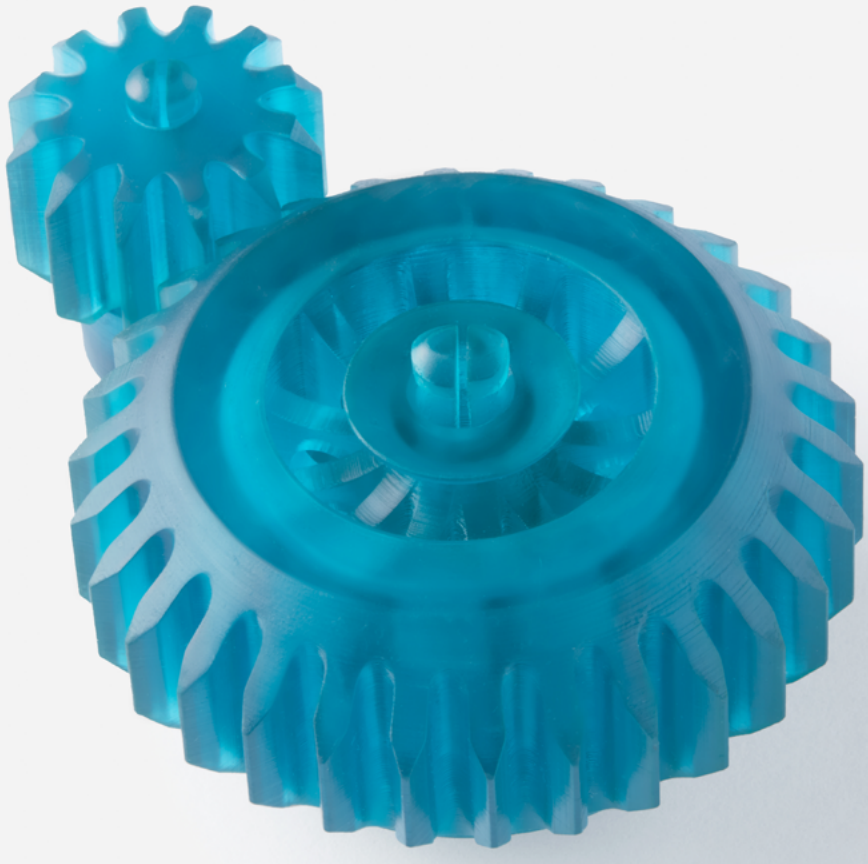
Tough Resin for Rugged Prototyping

Tough Resin balances strength and compliance, making it the ideal choice for prototyping strong, functional parts and assemblies that will undergo brief periods of stress or strain.

Sturdy prototypes

Interference and press fits

Assemblies



FLTOTL05

Prepared 01 . 26 . 2018
Rev 02 01 . 26 . 2018

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Tough Resin Material Properties Data

	METRIC[1]		IMPERIAL[1]		METHOD
	Green[2]	Post-Cured[3]	Green[2]	Post-Cured[3]	
Mechanical Properties					
Ultimate Tensile Strength	34.7 MPa	55.7 MPa	5040 psi	8080 psi	ASTM D 638-14
Tensile Modulus	1.7 GPa	2.7 GPa	239 ksi	387 ksi	ASTM D 638-14
Elongation at Break	42 %	24 %	42 %	24 %	ASTM D 638-14
Flexural Strength at 5% Strain	20.8 MPa	60.6 MPa	3020 psi	8790 psi	ASTM D 790-15
Flexural Modulus	0.6 GPa	1.6 GPa	90.3 ksi	241 ksi	ASTM D 790-15
Notched IZOD	32.6 J/m	38 J/m	0.61 ft-lbf/in	0.71 ft-lbf/in	ASTM D256-10
Thermal Properties					
Heat Deflection Temp. @ 1.8 MPa	32.8 °C	45.9 °C	91.1 °F	114.6 °F	ASTM D 648-16
Heat Deflection Temp. @ 0.45 MPa	40.4 °C	48.5 °C	104.7 °F	119.3 °F	ASTM D 648-16
Thermal Expansion (23 – 50 °C)	159.7 µm/m/°C	119.4 µm/m/°C	88.7 µin/in/°F	66.3 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 settings, without additional treatments.

[3] Data was obtained from parts printed using Form 2, 100 µm, Tough settings, and post-cured with 2.5 mW/cm^2 of 405 nm LED light 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 Hour Weight Gain (%)	Solvent	24 Hour Weight Gain (%)
Acetic Acid, 5 %	2.8	Hydrogen Peroxide (3 %)	2.1
Acetone	sample cracked	Isooctane	< 1
Isopropyl Alcohol	2.1	Mineral Oil, light	< 1
Bleach, ~5 % NaOCl	1.7	Mineral Oil, heavy	< 1
Butyl Acetate	1.6	Salt Water (3.5 % NaCl)	1.5
Diesel	< 1	Sodium hydroxide (0.025 %, pH = 10)	1.5
Diethyl glycol monomethyl ether	6.6	Water	1.6
Hydrolic Oil	< 1	Xylene	< 1
Skydrol 5	1.2	Strong Acid (HCl Conc)	distorted

MATERIAL DATA SHEET

Durable

Durable Resin for Low Friction and Wear

With low modulus, high elongation, and high impact strength, Durable Resin produces parts with a smooth, glossy finish and high resistance to deformation. Use this material for applications requiring minimal friction.

- Consumer packaging
- Bushings and bearings
- Snap fits and flexures
- Living hinges

FLDUCL02

Prepared 01 . 26 . 2018
Rev 02 01 . 26 . 2018

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Material Properties Data

	METRIC[1]		IMPERIAL[1]		METHOD
	Green[2]	Post-Cured[3]	Green[2]	Post-Cured[3]	
Tensile Properties					
Ultimate Tensile Strength	18.6 MPa	31.8 MPa	2.7 ksi	4.61 ksi	ASTM D 638-10
Tensile Modulus	0.45 GPa	1.26 GPa	65.7 ksi	183 ksi	ASTM D 638-10
Elongation	67 %	49 %	67 %	49 %	ASTM D 638-10
Flexural Properties					
Flexural Stress at 5% Strain	4.06 MPa	27.2 MPa	0.59 ksi	3.95 ksi	ASTM D 790-10, Procedure A
Flexural Modulus	0.16 GPa	0.82 GPa	23.4 ksi	119 ksi	ASTM D 790-10, Procedure A
Impact Properties					
Notched IZOD	130.8 J/m	109 J/m	2.46 ft-lbf/in	2.05 ft-lbf/in	ASTM D 256-10, Test Method A
Temperature Properties					
Heat Deflection Temp. @ 0.45 MPa	< 30 °C	43.3 °C	< 86 °F	110 °F	ASTM D 648-07, Method B
Thermal Expansion (23 to 50° C)	117.0 µm/m/°C	145.1 µm/m/°C	65.0 µin/in/°F	80.6 µin/in/°F	ASTM E831-14

[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 2.5 mW/cm^2 of 405 nm LED light 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:

Mechanical Properties	24 Hour Weight Gain (%)	Mechanical Properties	24 Hour Weight Gain (%)
Acetic Acid, 5 %	1.3	Hydrogen Peroxide (3 %)	1
Acetone	sample cracked	Isooctane	< 1
Isopropyl Alcohol	5.1	Mineral Oil, light	< 1
Bleach, ~5 % NaOCl	< 1	Mineral Oil, heavy	< 1
Butyl Acetate	7.9	Salt Water (3.5 % NaCl)	< 1
Diesel	< 1	Sodium hydroxide (0.025 %, pH = 10)	< 1
Diethyl glycol monomethyl ether	7.8	Water	< 1
Hydrolic Oil	< 1	Xylene	6.5
Skydrol 5	1.3	Strong Acid (HCl Conc)	distorted

MATERIAL DATA SHEET

Flexible

Flexible Resin for Ergonomic Features

Use Flexible Resin to produce parts that bend and compress. Flexible is excellent for simulating soft-touch materials and adding ergonomic features to multi-material assemblies.

- Handles, grips, and overmolds
- Wearables prototyping
- Stamps
- Cushioning and dampening
- Packaging

FLFLGR02

Prepared 04 . 19 . 2016
Rev 01 04 . 18 . 2017

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Material Properties Data

	METRIC[1]		IMPERIAL[1]		METHOD
	Green	Post-Cured[2]	Green	Post-Cured[2]	
Mechanical Properties					
Ultimate Tensile Strength[3]	3.3 - 3.4 MPa	7.7 - 8.5 MPa	483 - 494 psi	110 - 1230 psi	ASTM D 412-06 (A)
Elongation at Failure[3]	60 %	75 - 85 %	60 %	75 - 85 %	ASTM D 412-06 (A)
Compression Set[4,5]	0.40 %	0.40 %	0.40 %	0.40 %	ASTM D 395-03 (B)
Tear Strength	9.5 - 9.6 kN/m	13.3 - 14.1 kN/m	54 - 55 lbf/in	76 - 80 lbf/in	ASTM D 624-00
Shore Hardness	70 - 75 A	80 - 85 A	70 - 75 A	80 - 85 A	ASTM 2240
Thermal Properties					
Vicat Softening Point[6]	231 °C	230 °C	448 °F	446 °F	ASTM D 1525-09

[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, Flexible settings, and post-cured with 80.5 mW/cm2 of 365 nm fluorescent light for 60 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] Compression testing was performed at 23 °C after aging at 23 °C for 22 hours.

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

[6] Thermal testing was performed after 40+ hours with a 10 N loading at 50 °C/hour. Cracks formed in samples during testing.

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 %	1.3	Hydrogen Peroxide (3 %)	1.3
Acetone	33	Isooctane	< 1
Isopropyl Alcohol	9.8	Salt Water (3.5 % NaCl)	< 1
Bleach, ~5 % NaOCl	1.1	Sodium hydroxide (0.025 %, pH = 10)	1
Butyl Acetate	16	Xylene	29
Diethyl glycol monomethyl ether	30		

MATERIAL DATA SHEET

High Temp

High Temp Resin for Heat Resistance

High Temp Resin has a heat deflection temperature (HDT) of 289 °C @ 0.45 MPa—the highest on the 3D printing materials market. Use it to print models for environmental testing, or create molds and masters for production processes like casting and thermoforming.

- Heat resistant fixtures
- Hot air and fluid flow
- Environmental testing
- Housing components
- Mold prototyping

FLHTAM01

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Prepared 09 . 15 . 2016
Rev 01 04 . 18 . 2017

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Material Properties Data

	METRIC[1]		IMPERIAL[1]		METHOD
	Green[2]	Post-Cured[3]	Green[2]	Post-Cured[3]	
Mechanical Properties					
Ultimate Tensile Strength	33 MPa	51.1 MPa	4790 psi	7410 psi	ASTM D 638-14
Tensile Modulus	1.5 GPa	3.6 GPa	222 ksi	525 ksi	ASTM D 638-14
Elongation at Break	9 %	2 %	9 %	2 %	ASTM D 638-14
Flexural Strength at Break	41.2 MPa	106.9 MPa	5980 psi	15500 psi	ASTM D 790-15
Flexural Modulus	1.1 GPa	3.3 GPa	158 ksi	478 ksi	ASTM D 790-15
Notched IZOD	12.3 J/m	14 J/m	0.23 ft-lbf/in	0.26 ft-lbf/in	ASTM D 256-10
Water Absorption	N/A	0.21 %	N/A	0.21 %	ASTM D 570-98
Thermal Properties					
Heat Deflection Temp. @ 1.8 MPa	42.3 °C	130 °C	108.1 °F	266 °F	ASTM D 648-16
Heat Deflection Temp. @ 0.45 MPa	55.9 °C	289 °C	132.6 °F	552.2 °F	ASTM D 648-16
Thermal Expansion (0 – 150 °C)	120.9 µm/m/°C	87.5 µm/m/°C	67.2 µin/in/°F	48.6 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, without additional treatments.

[3] Data was obtained from parts printed using Form 2, 100 µm, High Temp settings, and post-cured with 80.5 mW/cm^2 of 365 nm fluorescent light for 60 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 Hour Weight Gain (%)	Solvent	24 Hour Weight Gain (%)
Acetic Acid, 5 %	< 1	Hydrogen Peroxide (3 %)	< 1
Acetone	< 1	Isooctane	< 1
Bleach, ~5 % NaOCl	< 1	Mineral Oil, light	< 1
Butyl Acetate	< 1	Mineral Oil, heavy	< 1
Diesel	< 1	Salt Water (3.5 % NaCl)	< 1
Diethyl glycol monomethyl ether	< 1	Sodium hydroxide (0.025 %, pH = 10)	< 1
Hydrolic Oil	< 1		

Dentistry

Professional Materials for Digital Dentistry

Formlabs Dental Resins empower you to rapidly manufacture a range of dental products, all in-house, from biocompatible surgical guides to orthodontic models, splints, retainers, and aligners.

DENTAL MODEL
FLDMBE02

DENTAL SG
FLDGOR01

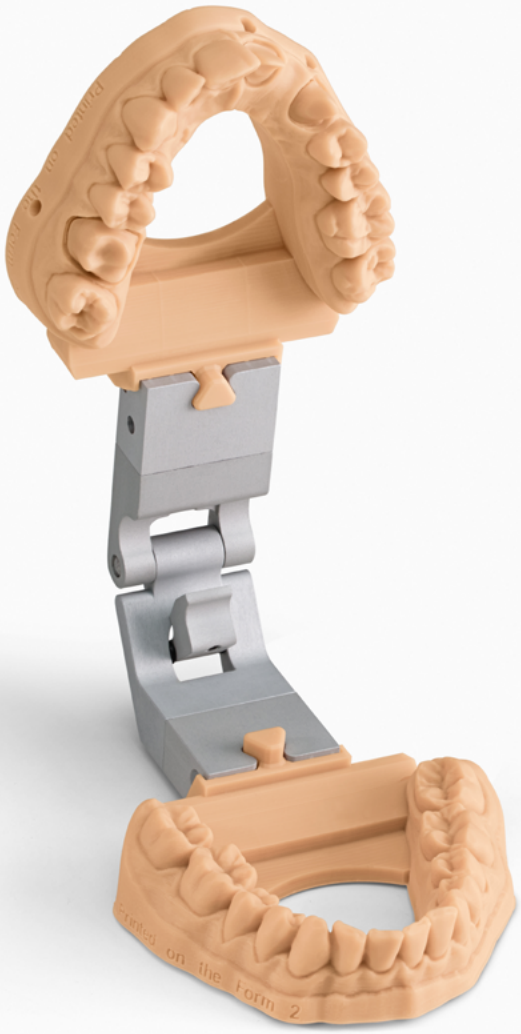
DENTAL LT CLEAR
FLDLCL01

MATERIAL DATA SHEET

Dental Model

Dental Model for High-Precision, High-Accuracy

Designed for crown and bridge models with removable dies, Dental Model Resin is a high-precision, high-accuracy resin. Print crisp margins and contacts within +/- 35 microns, and removable dies with consistently tight fit. A smooth, matte surface finish and color similar to gypsum make it easy to switch from analog to digital model production.



FLDMBE02

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Prepared		02 . 10 . 2017
Rev	01	02 . 10 . 2017

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

	METRIC[1]		IMPERIAL[1]		METHOD
	Green[2]	Post-Cured[3]	Green[2]	Post-Cured[3]	
Mechanical Properties					
Tensile Strength at Yield	33 MPa	61 MPa	4800 psi	8820 psi	ASTM D 638-14
Tensile Modulus	1.6 GPa	2.7 GPa	230 ksi	397 ksi	ASTM D 638-14
Elongation at Failure	25 %	5 %	25 %	5 %	ASTM D 638-14
Flexural Properties					
Flexural Modulus	0.95 GPa	2.5 GPa	138 ksi	365 ksi	ASTM D 790-15
Flexural Strength at 5% Strain	33.9 MPa	95.8 MPa	4910 psi	13900 psi	ASTM D 790-15
Impact Properties					
Notched IZOD	27 J/m	33 J/m	0.5 ft-lbf/in	0.6 ft-lbf/in	ASTM D256-10
Thermal Properties					
Heat Deflection Temp. @ 264 psi	32.8 °C	45.9 °C	91.1 °F	114.6 °F	ASTM D 648-16
Heat Deflection Temp. @ 66 psi	40.4 °C	48.5 °C	104.7 °F	119.3 °F	ASTM D 648-16

[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, Dental Model settings, without additional treatments.

[3] Data was obtained from parts printed using Form 2, 100 µm, Dental Model settings, and post-cured with 1.25 mW/cm^2 of 405 nm LED light for 60 minutes.

Solvent Compatibility

G = Good resistance.
Parts exposed to this solvent should not experience a decrease in mechanical properties. (≤ 1% weight gain, ≤ 1% width increase over 24 hours for a 1 x 1 x 1 cm cube)

X = Unacceptable resistance.
Parts exposed to this solvent will experience a significant decrease in mechanical properties as well as visible degradation. (> 2% weight gain, > 2% width increase over 24 hours for a 1 x 1 x 1 cm cube)

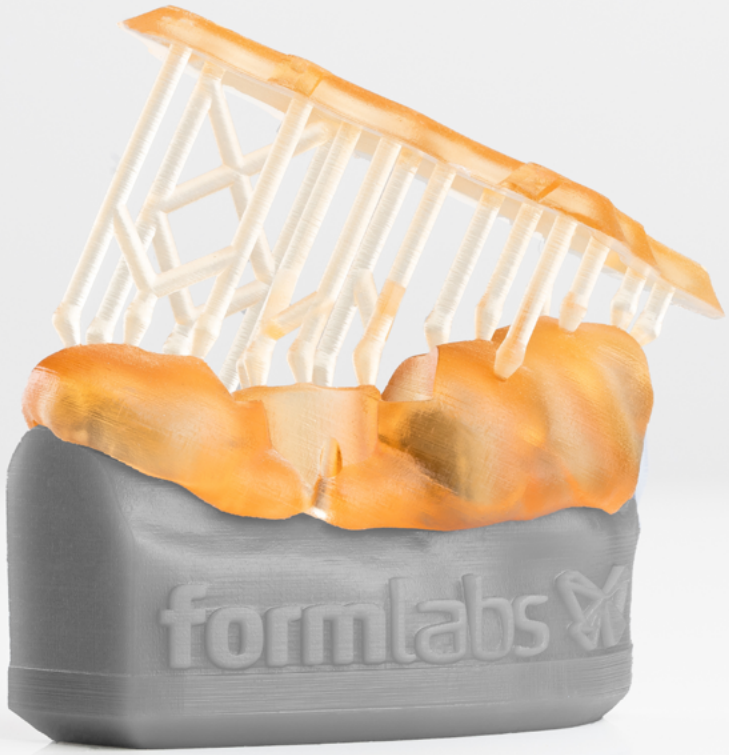
Solvent	Green	Post-Cured	Solvent	Green	Post-Cured
Acetic Acid, 5 %	G	G	Isooctane	G	G
Acetone	X	X	Isopropyl Alcohol	X	G
Bleach, ~5 % NaOCl	G	G	Sodium hydroxide (0.025 %, pH = 10)	G	G
Butyl Acetate	X	G	Salt Water (3.5 % NaCl)	G	G
Diethyl glycol monomethyl ether	X	G	Water	G	G
Hydrogen Peroxide (3 %)	G	G	Xylene	X	G

MATERIAL DATA SHEET

Dental SG

Biocompatible Photopolymer Resin for Form 2

Formlabs Dental SG Resin produces strong, accurate, biocompatible parts ideal for a dental surgical guide and similar applications, and is specifically designed to work with your Form 2 3D Printer. After being post-cured, this material can be steam sterilized in an autoclave, or by gamma-ray sterilization.



FLDGOR01

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Prepared 04 . 15 . 2016
Rev 01 04 . 15 . 2016

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Material Properties Data

	METRIC	METHOD
	Post-Cured	
Flexural Properties		
Flexural Strength	≥ 50 MPa	ISO 20795-1:2013
Flexural Modulus	≥ 1500 Mpa	ISO 20795-1:2013
Hardness Properties		
Hardness Shore D	≥ 80 D	per ISO 868:2003
Impact Properties		
Charpy Impact Strength Unnotched	12 - 14 kJ/m^2	ISO 179:2010

Dental SG is tested at NAMSA, Chasse sur Rhône in France, and is certified biocompatible per EN-ISO 10993-1:2009/AC:2010:

- Non-mutagenic.
- Non-cytotoxic.
- Not induce any erythema or edema reactions.
- Not a sensitizer.
- Not cause systemic toxicity.

The product is in compliance with ISO Standards:

- EN-ISO 20795-1:2013 (Dentistry – Base Polymers – Part 1: Denture Base Polymers)
- EN-ISO 7405:2009/A1:2013 (Dentistry – Evaluation of biocompatibility of medical devices used in dentistry)
- EN-ISO 10993-1:2009/AC:2010 (Biological evaluation of medical devices – Part 1 – Evaluation and testing)

NOTES:

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

[2]Data refers to post-cured properties obtained after exposing green parts to 108 watts each of Blue UV-A (315 – 400 nm) and UV-Blue (400 – 550 nm) light, in a heated environment at 60 °C (140 °F), with six (6) 18W/71 lamps (Dulux L Blue) and six (6) 18W/78 lamps (Dulux blue UV-A).

MATERIAL DATA SHEET

Dental LT Clear

Class IIa Long-Term Biocompatible Resin for Form 2

Formlabs Dental LT Clear Resin produces strong, accurate, biocompatible parts ideal for dental splints, retainers, and similar applications, and is specifically designed to work with your Form 2 3D printer.

FLDLCL01

formlabs

Prepared 10 . 04 . 2017
Rev 01 10 . 04 . 2017

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Material Properties Data

	METRIC	METHOD
	Post-cured	
Flexural Properties		
Ultimate Flexural Strength	≥ 50 MPa (no break)	ISO 20795-2:2013
Flexural Modulus	≥ 1300 Mpa	ISO 20795-2:2013
Hardness Properties		
Hardness Shore D	80 - 90D	ISO 868:2003
Impact Properties		
Maximum stress intensity factory	≥ 1.1 $MPa \cdot m^{1/2}$	ISO 179:2010
Total fracture work	≥ 250 J/m^2	ISO 20795-2:2013

Dental LT Clear is tested at NAMSA, Chasse sur Rhône in France, and is certified biocompatible per EN-ISO 10993-1:2009/AC:2010. Further details are available upon request.

The product is in compliance with ISO Standards:

- EEN ISO 1641:2009
- EN-ISO 10993-1:2009/AC:2010
- EN-ISO 10993-3:2009
- EN-ISO 10993-5:2009
- EN 908:2008

MATERIALS LIBRARY

Jewelry

Capture Superb Detail With Castable Resin

Castable Resin was designed to capture precise details and smooth surfaces. It burns out cleanly without ash or residue, allowing jewelers and casting houses to go straight from digital design to a 3D print suitable for direct investment casting.

FLCABL02

Prepared . .
Rev 01 03 . 02 . 2018

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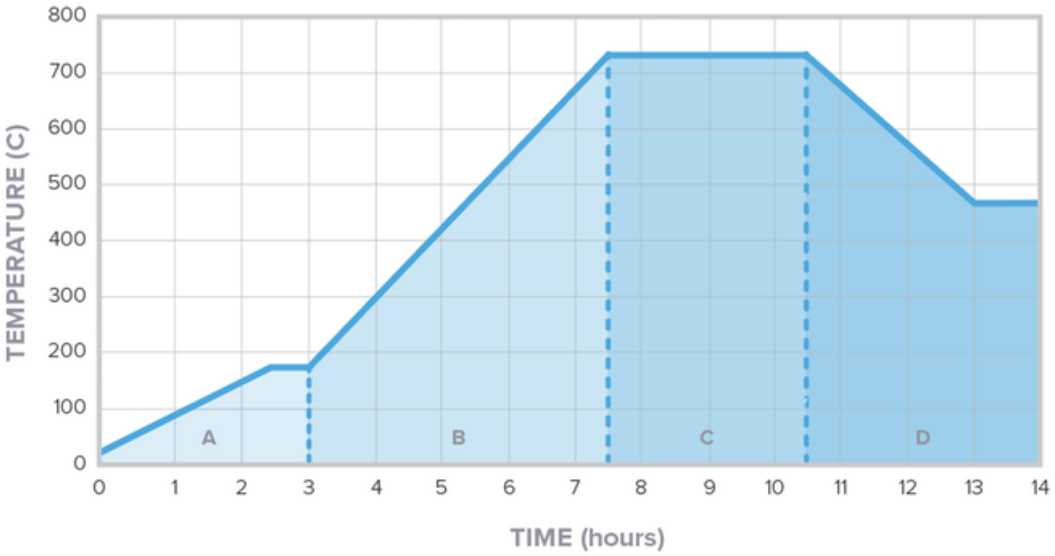
Material Properties Data

	METRIC	IMPERIAL	METHOD
Mechanical Properties[1]			
Tensile Strength at Break	11.6 MPa	1680 psi	ASTM D 638-10
Tensile Modulus	220 MPa	32 ksi	ASTM D 638-10
Elongation at Failure	13 %	13 %	ASTM D 638-10

[1] Data was obtained from parts printed using Form 2, Castable 50 µm Fine Detail settings, and post-cured with 2.5 mW/cm^2 of fluorescent bulb UV light, centered at 405 mm.

Recommended Burnout Curve

We specifically recommend Plasticast with BANDUST. If seeking alternatives, look for investments advertised to work with photopolymers. Customers have reported success with Kerr SatinCast and Omega+ by Goldstar Powders. You can also experiment with bonded investments, like those typically used for dental applications. Some casting houses have also developed proprietary investments.



Post-Curing Info:

Formlabs recommends post-curing Castable Resin parts for 280 minutes at 45 °C.

PROCESS		
Ramp	167 °C/h	300 °F/h
Change Ramp	167 °C/h	300 °F/h
Ramp	56 °C/h	100 °F/h
Hold	177 °C 30 min	350 °F 30 min
Ramp	117 °C/h	210 °F/h
Hold	732 °C 3 h	1350 °F 3 h
Ramp	–111 °C/h	–200 °F/h
Hold	482 °C 1 h	900 °F 1 h

Form Wash + Form Cure

Post-Processing Designed for the Form 2

AUTOMATE CLEANING WITH FORM WASH

Form Wash automatically cleans uncured liquid resin from 3D printed parts' surfaces, getting every nook and cranny perfectly clean.

SET IT AND FORGET IT

Form Cure precisely controls temperature and light to bring parts to their maximum mechanical properties.