

Castable Wax 40

From intricate bridal jewelry to large demanding pieces, Castable Wax 40 Resin offers the easiest workflow on the market for 3D printing and casting challenging, highly detailed designs.

Castable Wax 40 resin offers high detail and surface smoothness, with handling characteristics similar to blue carving wax. With a 40% wax fill and low expansion, Castable Wax 40 Resin supports a wide range of lost wax casting conditions and is compatible with leading gypsum investments.

**FLCW4001**

* May not be available in all regions

Prepared 12 . 10 . 2020

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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.

	METRIC ¹	IMPERIAL ¹	METHOD
	Green ²	Green ²	
Burnout Properties			
Temperature @ 5% Mass Loss	249 °C	480 °C	ASTM E 1131
Ash content (TGA)	0.0 - 0.1%	0.0 - 0.1%	ASTM E 1131

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, 50 µm, Castable Wax 40 Resin settings, without post-cure.

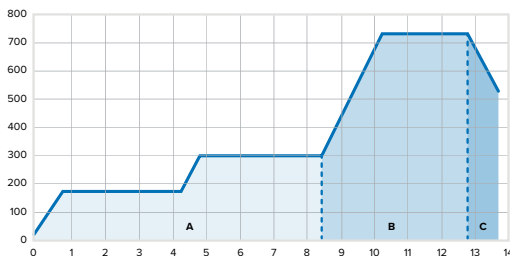
STANDARD BURNOUT SCHEDULE

The following burnout schedule is designed to help reduce thermal expansion of resin in the mold, while ensuring a complete burnout for thick jewelry parts. Formlabs recommends Certus Prestige Optima™ investment powder.

Use this schedule as a starting point and make adjustments as needed.

Learn how to fine tune burnout and investment preparation for best performance on the support page.

		PHASE	TIME	SCHEDULE °C	SCHEDULE °F
	Heated Bench Rest Place flasks into oven for heated drying after investment set period (30-60 min). Elevated temperature melts solid wax in resin to reduce expansion.	Hold	180 minutes	55 °C	131 °F
A	Thermal Transition Wax sprue melts out, increasing airflow to the resin pattern. Wax in resin diffuses out into investment. Burnout begins gently, breaking down pattern without forceful expansion.	Ramp	48 minutes	2 °C / min	3.6 °F / min
		Hold	180 minutes	150 °C	302 °F
		Ramp	75 minutes	2.0 °C / min	3.6 °F / min
		Hold	180 minutes	300 °C	572 °F
B	Burnout Eliminates the remaining resin and ash in the investment.	Ramp	108 minutes	4.0 °C / min	7.2 °F / min
		Hold	180 min	732 °C	1350 °F
C	Casting Temperature Cool the flask to casting temperature of the selected metal.	Ramp	44 minutes	- 5 °C / min	- 9 °F / min
		Casting Window	Up to 2 hours	Desired casting temp	Desired casting temp



Washing Info:

Wash Castable Wax 40 prints in isopropyl alcohol (IPA) for 5 minutes. Rinse for 5 minutes in a second, cleaner IPA bath to eliminate any remaining uncured material. Fully dry parts with compressed air. Do not use TPM to wash.

Post-Curing Info:

Post-curing is not required for bulky Castable Wax 40 prints, but can increase handling strength if desired. Cure parts for up to 30 minutes with no heat.

Castable Wax

Sharp Detail and Clean Casting Every Time.

A 20% wax-filled photopolymer for reliable casting with zero ash content and clean burnout, Castable Wax Resin accurately captures intricate features and offers the smooth surfaces stereolithography 3D printing is known for.



FLCWP001

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	METRIC ¹	IMPERIAL ¹	METHOD
	Green ²	Green ²	
Tensile Properties			
Ultimate Tensile Strength	12 MPa	1680 psi	ASTM D 638-10
Tensile Modulus	220 MPa	32 ksi	ASTM D 638-10
Elongation at Break	13%	13%	ASTM D 638-10
Burnout Properties			
Temp @ 5% Mass Loss	249 °C	480 °C	ASTM E 1131
Ash Content (TGA)	0.0 - 0.1%	0.0 - 0.1%	ASTM E 1131

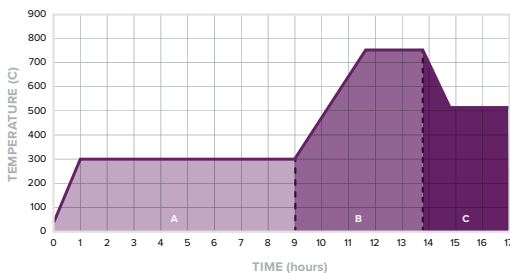
¹ Material properties can vary with part geometry, print orientation, print settings, and temperature.

² Data was obtained from parts printed using Form 2, Castable 50 µm Fine Detail settings and washed without post-cure.

STANDARD BURNOUT SCHEDULE

The Standard Burnout Schedule is designed to provide the maximum possible investment strength and complete burnout of the finest details using Certus Prestige Optima or similar investment materials. Use this schedule as a starting point and make adjustments as needed.

	PHASE	TIME	SCHEDULE °C	SCHEDULE °F
A	Insert Flasks	0 min	21 °C	70 °F
	Ramp	60 min	4.7 °C / min	8.4 °F / min
	Hold	480 min	300 °C	572 °F
B	Ramp	100 min	4.5 °C / min	8.1 °F / min
	Hold	180 min	750 °C	1382 °F
C	Ramp	60 min	- 4.0 °C / min	- 7.1 °F / min
	Casting Window	Up to 2 hours	512 °C (or desired casting temp)	954 °F (or desired casting temp)



Post-Curing Info:

No post-cure required.

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



FLHTAM02

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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			

General Purpose Resins

Materials for High Resolution Models and Rapid Prototyping

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

Strong and Precise. Our resins create accurate and robust parts, ideal for rapid prototyping, functional testing and product development.

Smooth Surface Finish. Perfectly smooth right out of the printer, parts printed on the Formlabs stereolithography printers have the polish and finish of a final product.



V4 Clear
FLGPCL04

V4 Grey
FLGPGR04

V2 Draft
FLDRGR02

V1 Grey Pro
FLPRGR01

V4 White
LGPWH04

V4 Black
FLGPBL04

V4 Color
FLGPCB01

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MATERIAL PROPERTIES DATA

Standard Resins

The following material properties are comparable for Clear Resin, White Resin, Grey Resin, Black Resin, and Color Kit.

	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 D638-14
Tensile Modulus	1.6 GPa	2.8 GPa	234 ksi	402 ksi	ASTM D638-14
Elongation at Break	12%	6%	12%	6%	ASTM D638-14
Flexural Properties					
Flexural Modulus	1.3 GPa	2.2 GPa	181 psi	320 psi	ASTM D 790-15
Impact Properties					
Notched Izod	16 J/m	25 J/m	0.3 ft-lbf/in	0.46 ft-lbf/in	ASTM D256-10
Thermal Properties					
Heat Deflection Temp. @ 1.8 MPa	43 °C	58 °C	109 °F	137 °F	ASTM D 648-16
Heat Deflection Temp. @ 0.45 MPa	50 °C	73 °C	121 °F	163 °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, 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/cm² 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 hr weight gain, %	Solvent	24 hr weight gain, %
Acetic Acid 5%	< 1	Mineral oil (Light)	< 1
Acetone	Sample cracked	Mineral oil (Heavy)	< 1
Bleach ~5% NaOCl	< 1	Salt Water (3.5% NaCl)	< 1
Butyl Acetate	< 1	Skydrol 5	1
Diesel Fuel	< 1	Sodium Hydroxide solution (0.025% PH 10)	< 1
Diethyl glycol Monomethyl Ether	1.7	Strong Acid (HCl conc)	Distorted
Hydraulic Oil	< 1	Water	< 1
Hydrogen peroxide (3%)	< 1	Xylene	< 1
Isooctane (aka gasoline)	< 1		
Isopropyl Alcohol	< 1		