

Precision Model Resin

Formlabs' most accurate material for printing high quality restorative models

Precision Model Resin is a high-accuracy material for creating restorative models with >99% of printed surface area within 100 µm of the digital model. Create beautiful models with crisp margin lines thanks to high opacity, beige color, and a smooth, matte finish to capture fine details.

Precision Model Resin is a new material that leverages the Form 4 ecosystem to print three times as fast as previous formulations of Model Resin.

Restorative models

Crown fit test models

Implant models

Removable die models



FLPMBE01

Prepared 20/03/2024

Rev. 01 20/03/2024

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	METRIC ¹		IMPERIAL ¹		METHOD
	Green ²	Post-Cured ³	Green ²	Post-Cured ³	
Tensile Properties	METRIC ¹		IMPERIAL ¹		METHOD
Ultimate Tensile Strength	44 MPa	50 MPa	6390 psi	7190 psi	ASTM D638-14
Tensile Modulus Elongation	2.0 GPa	2.2 GPa	293 ksi	326 ksi	ASTM D638-14
at Break	11%	8.60%	11 %	8.60%	ASTM D638-14
Flexural Properties	METRIC ¹		IMPERIAL ¹		METHOD
Flexural Strength Flexural	68 MPa	87 MPa	9863 psi	12618 psi	ASTM D790-15
Modulus	1.7 GPa	2.3 GPa	247 ksi	334 ksi	ASTM D790-15
Impact Properties	METRIC ¹		IMPERIAL ¹		METHOD
Notched Izod	28 J/m	32 J/m	0.52 ft-lb/in	0.59 ft-lb/in	ASTM D256-10
Unnotched Izod	440 J/m	262 J/m	8.3 ft-lb/in	4.9 ft-lb/in	ASTM D4812-11
Thermal Properties	METRIC ¹		IMPERIAL ¹		METHOD
Heat Deflection Temp. @ 1.8 MPa	45.1 °C	46.3 °C	113.2 °F	115.3 °F	ASTM D648-16
Heat Deflection Temp. @ 0.45 MPa	51.7 °C	53.5 °C	125.1 °F	128.3 °F	ASTM D648-16
Thermal Expansion	80.2 µm/m/°C	81.1 µm/m/°C	44.6 µin/in/°F	45.1 µin/in/°F	ASTM E813-13

SOLVENT COMPATIBILITY

Percent weight gain over 24 hours for a printed 1 x 1 x 1 cm cube immersed in respective solvent:

Solvent	24 hr weight gain, %	Solvent	24 hr weight gain, %
Acetic Acid 5%	1.0	Mineral oil (Heavy)	0.2
Acetone	10.3	Mineral oil (Light)	0.3
Bleach ~5% NaOCl	0.8	Salt Water (3.5% NaCl)	0.9
Butyl Acetate	0.6	Skydrol 5	0.3
Diesel Fuel	0.2	Sodium Hydroxide solution (0.025% PH 10)	0.9
Diethyl glycol Monomethyl Ether	2.1	Strong Acid (HCl conc)	0.5
Hydraulic Oil	0.2	Tripropylene glycol monomethyl ether	0.3
		Water	0.9
Hydrogen peroxide (3%)	1.01	Xylene	< 0.1
Isooctane (aka gasoline)	-0.03		
Isopropyl Alcohol	0.6		

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

² Data was obtained from green parts printed on a Form 4 printer with 50 µm Precision Model Resin settings, washed in a Form Wash for 5 minutes in 99% Isopropyl Alcohol, and air dried without post cure.

³ Data for post-cured samples were measured on Type I tensile bars printed on a Form 4 printer with 50 µm Precision Model settings, washed in a Form Wash for 5 minutes in 99% Isopropyl Alcohol, and post-cured at 55°C for 5 minutes in a Form Cure.

Fast Model Resin

Formlabs' fastest resin, capable of printing at speeds up to 100mm/hr

Fast Model Resin is capable of printing dental models in less than 10 minutes or large prototypes in less than 2 hours. This highly accurate resin leverages the Form 4 ecosystem to print three times faster than previous formulations of Draft Resin. Use 200 micron settings for fastest print speeds, or use 100 micron settings for more detailed models.

Initial prototypes

Rapid design iterations

Dental models for thermoforming aligners



V1 **FLFMGR01**

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Material Properties		METRIC ¹			IMPERIAL ¹			METHOD
		Green	Post-Cured for 5 min at ambient temperature ³	Post-Cured for 15 min at 60 °C ⁴	Green	Post-Cured for 5 min at ambient temperature ³	Post-Cured for 15 min at 140 °F ⁴	
Tensile Properties		METRIC ¹			IMPERIAL ¹			METHOD
Ultimate Tensile Strength		46 MPa	55 MPa	62 MPa	6670 psi	7980 psi	8990 psi	ASTM D638-14
Tensile Modulus		2.18 GPa	2.48 GPa	2.67 GPa	320 ksi	360 ksi	390 ksi	ASTM D638-14
Elongation at Break		22%	15%	11%	22%	15%	11%	ASTM D638-14
Flexural Properties		METRIC ¹			IMPERIAL ¹			METHOD
Flexural Strength		74 MPa	98 MPa	106 MPa	10700 psi	14200 psi	15400 psi	ASTM D790-15
Flexural Modulus		1.96 GPa	2.60 GPa	2.74 GPa	280 ksi	380 ksi	400 ksi	ASTM D790-15
Impact Properties		METRIC ¹			IMPERIAL ¹			METHOD
Notched Izod		34 J/m	30 J/m	37 J/m	0.64 ft-lb/in	0.56 ft-lb/in	0.69 ft-lb/in	ASTM D4812-11
Thermal Properties		METRIC ¹			IMPERIAL ¹			METHOD
Heat Deflection Temp. @ 1.8 MPa		47 °C	49 °C	61 °C	117 °F	120 °F	142 °F	ASTM D648-16
Heat Deflection Temp. @ 0.45 MPa		55 °C	58 °C	76 °C	131 °F	136 °F	167 °F	ASTM D648-16

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%	0.6	Mineral oil (Heavy)	0.2
Acetone	8.9	Mineral oil (Light)	0.1
Bleach ~5% NaOCl	0.7	Salt Water (3.5% NaCl)	0.8
Butyl Acetate	0.5	Skydrol 5	1.0
Diesel Fuel	< 0.1	Sodium Hydroxide solution (0.025% PH 10)	0.8
Diethyl glycol Monomethyl Ether	3.1	Strong Acid (HCl conc)	0.5
Hydraulic Oil	0.2	Tripropylene glycol monomethyl ether	0.7
Hydrogen peroxide (3%)	0.9	Water	0.8
Isooctane (aka gasoline)	< 0.1	Xylene	0.2
Isopropyl Alcohol	0.8		

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

² Data was obtained from green parts printed on a Form 4 printer with 100 µm Fast Model Resin settings, washed in a Form Wash for 5 minutes in 99% Isopropyl Alcohol, and air dried without post-cure.

³ Data was obtained from parts printed on a Form 4 printer with 100 µm Fast Model Resin settings, washed in a Form Wash for 5 minutes in 99% Isopropyl Alcohol, and post-cured at room temperature for 5 minutes in a Form Cure.

⁴ Data was obtained from parts printed on a Form 4 printer with 100 µm Fast Model Resin settings, washed in a Form Wash for 5 minutes in 99% Isopropyl Alcohol, and post-cured at 60°C for 15 minutes in a Form Cure.

⁵ Fast Model Resin was tested at NAMSA World Headquarters, OH, USA.

Dental LT Comfort Resin

A Flexible And Durable Material For Optimally Comfortable
Long-Term Splints, Night Guards, and Bleaching Trays

Directly print flexible occlusal splints in-house, more easily than ever. Printed splints are easily polished to high optical transparency, and offer enhanced comfort and durability that boosts patient adoption and compliance.

Occlusal Splints

Night Guards

Bleaching Trays



V1 FLDLC001

V1.1 FDLCO11

* May not be available in all regions

Prepared 23/05/2023

Rev. 02 26/05/2023

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Material Properties	METRIC ¹	METHOD
	Post-Cured ²	
	METRIC ²	METHOD
Mechanical Properties		
Elongation at Break	33%	ASTM D638-14 (Type IV)
Flexural Properties	METRIC ¹	METHOD
Flexural Strength Flexural	21 MPa	ASTM D790-15 (Method B)
Modulus	643 MPa	ASTM D790-15 (Method B)
	METRIC ¹	METHOD
Hardness Properties		ASTM D2240-15 (Type D)
		METHOD
Hardness Shore D	75D	ASTM D256-10 (Method A)
Impact Properties	METRIC ¹	METHOD
	98 J/m	
Notched Izod	METRIC ¹	
Other Properties		
	31 ug/mm ³	
Water Sorption	4 ug/mm ³	ISO 20795-2
Water Solubility		ISO 20795-2

Dental LT Comfort Resin has been evaluated in accordance with ISO 10993-1:2018, Biological evaluation of medical devices - Part 1: Evaluation and testing within a risk management process, and ISO 7405:2018, Dentistry - Evaluation of biocompatibility of medical devices used in dentistry, and passed the requirements for the following biocompatibility risks:

ISO Standard	Description ³
ISO 10993-5:2009	Not cytotoxic
ISO 10993-23: 2021	Not an irritant
ISO 10993-10:2021	Not a sensitizer
ISO 10993-11:2017	Not toxic
ISO 10993-3:2014	Not genotoxic

The product was developed and is in compliance with the following ISO Standards:

ISO Standard	Description
EN ISO 13485:2016	Medical Devices – Quality Management Systems – Requirements for Regulatory Purposes
EN ISO 14971:2012	Medical Devices – Application of Risk Management to Medical Devices

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

² Data were measured on post-cured samples printed on a Form 3B with 100 µm Dental LT Comfort Resin settings, washed in a Form Wash for 10 minutes in 99% Isopropyl Alcohol, and post-cured at 60 °C for 20 minutes in a Form Cure.

³ Dental LT Comfort Resin was tested at NAMSA World Headquarters, OH, USA.

Dental LT Clear Resin V2

Adurable, color-corrected material for printing hard occlusal splints

Directly print affordable, high-quality occlusal splints in-house with Dental LT Clear Resin (V2). Highly durable and resistant to fracture, this color-corrected material prints clear, polishes to high optical transparency, and resists discoloration over time for a finished appliance you'll be proud to deliver.

Occlusal guards

Splints



V1

FLDLCL02

* May not be available in all regions

Prepared 09/16/2020

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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.

Material Properties	METRIC ¹	METHOD
	Post-Cured ²	
	METRIC	
Tensile Properties	52 MPa	METHOD
Ultimate Tensile Strength	2080 MPa	ASTM D638-10 (Type IV)
Young's Modulus	12%	ASTM D638-10 (Type IV)
Elongation at Break	METRIC ¹	ASTM D638-10 (Type IV)
Flexural Properties	84 MPa	METHOD
Flexural Strength	2300 MPa	ASTM D790-15 (Method B)
Flexural Modulus	METRIC ¹	ASTM D790-15 (Method B)
Hardness Properties		METHOD
Hardness Shore D	78D	ASTM D2240-15 (Type D) ASTM D4812-11 (Unnotched)
Impact Properties	METRIC ¹	METHOD
Unnotched Izod	449 J/m	
	METRIC ¹	
Other Properties	0.54%	
Water Absorption		ASTM D570-98 (2018)

Dental LT Clear Resin (V2) has been evaluated in accordance with ISO 10993-1:2018, Biological evaluation of medical devices - Part 1: Evaluation and testing within a risk management process, and ISO 7405:2018, Dentistry - Evaluation of biocompatibility of medical devices used in dentistry, and passed the requirements for the following biocompatibility risks:

ISO Standard	Description ³
ISO 10993-5:2009	Not cytotoxic
ISO 10993-10:2010/(R)2014	Not an irritant
ISO 10993-10:2010/(R)2014	Not a sensitizer
ISO 10993-3:2014	Not mutagenic
ISO 10993-17:2002, ISO 10993-18:2005	Not toxic (subacute / subchronic)

The product was developed and is in compliance with the following ISO Standards:

ISO Standard	Description
EN ISO 13485:2016	Medical Devices – Quality Management Systems – Requirements for Regulatory Purposes
EN ISO 14971:2012	Medical Devices – Application of Risk Management to Medical Devices

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

² Data were measured on post-cured samples printed on a Form 3B printer with 100 µm Dental LT Clear Resin (V2) settings, washed in a Form Wash for 20 minutes in 99% isopropyl alcohol, and post-cured at 60 °C for 60 minutes in a Form Cure.

³ Dental LT Clear Resin (V2) was tested at NAMSA World Headquarters, OH, USA.

Surgical Guide Resin

Surgical Guide Resin is designed to print at 100 micron and 50 micron layer line resolution on Formlabs SLA printers to produce dimensionally accurate dental implant guides and templates.

Surgical guides

Device sizing templates

Pilot drill guides

Drilling templates



V1

FLSGAM01

* May not be available in all regions

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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.

Material Properties	Post-Cured ^{1,2}	Method
Elongation at Break	12%	ASTM D638
Flexural Strength	> 102 MPa	ASTM D790
Flexural Modulus	> 2400 MPa	ASTM D790

Sterilization Compatibility

E-beam	35 kGy E-beam radiation
Ethylene Oxide	100% Ethylene oxide at 55 °C for 180 minutes
Gamma	29.4 - 31.2 kGy gamma radiation
Steam Sterilization	Autoclave at 134 °C for 20 minutes Autoclave at 121 °C for 30 minutes

For more details on sterilization compatibilities, visit formlabs.com

Disinfection Compatibility

Chemical Disinfection	70% Isopropyl Alcohol for 5 minutes
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Surgical Guide Resin is a Class I Medical Device as defined in Article 2 of the Medical Device Regulation 2017/74 (MDR) in the EU and in Section 201(h) of the Federal Food Drug & Cosmetic (FD&C) Act.

Surgical Guide Resin has been evaluated in accordance with ISO 10993-1, Biological evaluation of medical devices - Part 1: Evaluation and testing within a risk management process, and ISO 7405, Dentistry - Evaluation of biocompatibility of medical devices used in dentistry, and passed the requirements for the following biocompatibility risks:

ISO Standard	Description ³
EN ISO 10993-5 EN	Not cytotoxic
ISO 10993-10 EN	Not an irritant
ISO 10993-10	Not a sensitizer

The product was developed and is in compliance with the following ISO Standards:

ISO Standard	Description
EN ISO 13485	Medical Devices – Quality Management Systems – Requirements for Regulatory Purposes
EN ISO 14971	Medical Devices – Application of Risk Management to Medical Devices

¹ Material properties may vary based on part geometry, print orientation, print settings, temperature, and 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 Surgical Guide Resin settings, washed in a Form Wash for 20 minutes in ≥99% Isopropyl Alcohol, and post-cured at 60 °C for 30 minutes in a Form Cure.

³ Surgical Guide Resin was tested at NAMSA World Headquarters, OH, USA.

IBT Flex Resin

A Flexible, and Tear-Resistant Material for Printing Highly Accurate Indirect Bonding Trays and Direct Composite Restoration Guides with Enhanced Translucency

3D print flexible and tear-resistant translucent trays and guides that save you time and deliver consistent, predictable outcomes. IBT Flex Resin is a Class I biocompatible material with enhanced flexibility, strength, translucency, and color to guarantee optimal clinical outcomes while providing a great patient experience and for seamless and precise transfer of orthodontic brackets and restorative composite materials.

Direct Composite Restoration Guides

Indirect Bonding Trays



FLIBFL01

* May not be available in all regions

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Material Properties

	Post-Cured ^{1,2}	Method
Disinfection Compatibility		
Tensile Strength	7.2 MPa	ASTM D412
Tensile Modulus	8 MPa	ASTM D412
Elongation at Break Hardness	135 %	ASTM D412
Shore A Transparency (2 mm sample)	77 - 80A	ASTM D2240
	85%	-

Disinfection Compatibility

Chemical Disinfection	70% Isopropyl Alcohol for 5 minutes
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IBT Flex Resin has been evaluated in accordance with ISO 10993-1:2018, Biological evaluation of medical devices - Part 1: Evaluation and testing within a risk management process, and ISO 7405:2018, Dentistry - Evaluation of biocompatibility of medical devices used in dentistry, and passed the requirements for the following biocompatibility risks:

ISO Standard	Description ³
ISO 10993-5:2009	Met requirements of test
ISO 10993-23:2021	Met requirements of test
ISO 10993-10:2021	Met requirements of test

The product was developed and is in compliance with the following ISO Standards:

ISO Standard	Description
EN ISO 13485:2016	Medical Devices – Quality Management Systems – Requirements for Regulatory Purposes
EN ISO 14971:2012	Medical Devices – Application of Risk Management to Medical Devices

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

² Data was obtained from parts printed using Form 3B(+), 100 µm, IBT Flex Resin settings, and using post-processing instructions listed in the IBT Flex Resin Manufacturing Guide.

³ IBT Flex Resin was tested at NAMSA World Headquarters, OH, USA.

Premium Teeth Resin

For strong life-like denture teeth and temporary restorations

PremiumTeethResinis anano-ceramic filled biocompatible material withenhanced aesthetics, mechanical properties, andvalidatedlongevity to guarantee optimal clinicalperformance. 3D print denture teeth, temporary full-arch implant-supported restorations (All-on-X appliances), temporary single units (crowns, inlays, onlays, and veneers) and up to seven-unit bridges without compromising on intraoral mechanics, life-like aesthetics, and simplified workflows.

Temporary Single-units (crown, inlays, onlays, veneers) and Bridges (up to 7-units)

Temporary Full-Arch Implant-Supported Restorations (All-on-X Appliances)

Denture Teeth for Full and Partial Removable Dentures

Try-in Dentures



FLPTA20

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FLPTB101

FLPTBL01

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

Prepared

FLPTA30

Rev. 05

1

20/12/2023

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Material Properties

HT (High Translucency): A2, A3, B1,

BL Mechanical Properties	Post-Cured ^{1,2}	Method
Flexural Strength	155 MPa	ASTM D790
Flexural Modulus	4300 MPa	ASTM D790
Hardness	90 D	ASTM D2240
Sorption	36.2 µg/mm ³	ISO 10477:2018
Solubility	1.1 µg/mm ³	ISO 10477:2018
Opacity at 1 mm thickness	54%	-
Density	1.23 g/mL	-
Viscosity	1100 cP @ 25 °C	-
	450 cP @ 35 °C	

Premium Teeth Resin has been evaluated in accordance with ISO 10993-1:2018, Biological evaluation of medical devices - Part 1: Evaluation and testing within a risk management process, and ISO 7405:2018, Dentistry - Evaluation of biocompatibility of medical devices used in dentistry, and passed the requirements for the following biocompatibility risks:

ISO Standard	Description ³	
ISO 10993-5:2009	Cytotoxicity	Passed
ISO 10993-23:2021	Irritation	Passed
ISO 10993-10:2021	Sensitization	Passed
ISO 10993-11:2017	Toxicity	Passed
ISO 10993-3:2014	Genotoxicity	Passed

The product was developed and is in compliance with the following ISO Standards:

ISO Standard	Description
EN ISO 13485:2016	Medical Devices – Quality Management Systems – Requirements for Regulatory Purposes
EN ISO 14971:2012	Medical Devices – Application of Risk Management to Medical Devices

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

² Data was obtained from parts printed using Form 3B(+), 50 µm, Premium Teeth Resin settings, and using post-processing instructions listed in the Premium Teeth Resin Manufacturing Guide.

³ Premium Teeth Resin was tested at NAMSA World Headquarters, OH, USA.

Denture Base Resin

Long-lasting denture base material for truly lifelike permanent prosthetics

Denture Base Resin is a Class II long-term biocompatible material to enable dental professionals to produce 3D printed denture bases accurately and reliably. Denture Base Resin can be bonded to Premium Teeth Resin to create full or partial dentures with lifelike aesthetics.



FLDBLP01

FLDBOP01

FLDBDP01

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

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Material Properties	METRIC ¹	METHOD
	Post-Cured ²	
Mechanical Properties	METRIC ¹	METHOD
Flexural Strength	> 50 MPa	ISO 10477
Density	1.15 g/cm ³ < X < 1.25 g/cm ³	ASTM D792-00

Denture Base resin was tested for biological evaluation of medical devices at WuXi Aptec, 2540 Executive Drive, St. Paul, MN, and is certified biocompatible per EN-ISO 10993-1:2009/ AC:2010:

ISO Standard	Description
EN-ISO 10993-3:2014 EN-	Not mutagenic
ISO 10993-5:2009 EN-ISO	Not cytotoxic
10993-10:2010 EN-ISO	Not an irritant
10993-10:2010 EN-ISO	Not a sensitizer
10993-11:2006	Non toxic

The product was developed and is in compliance with the following ISO Standards:

Denture Base ISO Standards	Description
EN-ISO 22112:2017	Dentistry - Artificial teeth for dental prostheses
EN-ISO 10477	Dentistry - Polymer-based crown and veneering materials (Type 2 and Class 2)

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), in a heated environment at 80 °C (140 °F) and 1hr, with six (6) 18W/78 lamps (Dulux blue UV-A)

Custom Tray Resin

A production-ready material that enables highly accurate definitive impressions

Use Custom Tray Resin to directly print impression trays for implants, dentures, crowns and bridges, and other comprehensive cases. Digitally manufactured impression trays provide consistent, accurate impressions for high-quality dentistry. Custom Tray Resin prints full impression trays quickly using 200 micron layer heights, reducing labor time and enabling higher throughput.

Impression Trays



V1 **FLCTBL01**

* May not be available in all regions

Prepared 10/07/2020
Rev. 02 21/07/2024

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Material Properties	Post-Cured ^{1, 2}	Method
Ultimate Tensile Strength	> 70 MPa	ASTM D638
Young's Modulus Elongation	> 2500 MPa	ASTM D638
at Break Flexural Strength	> 3%	ASTM D638
Flexural Modulus Hardness	≥ 100 MPa	ASTM D790
Shore D	≥ 2600 MPa	ASTM D790
	> 80D	ASTM D2240

Disinfection Compatibility

Chemical Disinfection	70% Isopropyl Alcohol for 5 minutes
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Custom Tray Resin is a Class I Medical Device as defined in Article 2 of the Medical Device Regulation 2017/74 (MDR) in the EU and in Section 201(h) of the Federal Food Drug & Cosmetic (FD&C) Act.

Custom Tray Resin has been evaluated in accordance with ISO 10993-1, Biological evaluation of medical devices - Part 1: Evaluation and testing within a risk management process, and ISO 7405, Dentistry - Evaluation of biocompatibility of medical devices used in dentistry, and passed the requirements for the following biocompatibility risks:

ISO Standard	Description ³
EN ISO 10993-5 EN	Not cytotoxic
ISO 10993-10 EN	Not an irritant
ISO 10993-10	Not a sensitizer

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 200 µm Custom Tray Resin settings, washed in a Form Wash for 10 minutes in 99% Isopropyl Alcohol, and post-cured at 60°C for 30 minutes in a Form Cure.

³ Custom Tray Resin was tested at NAMS World Headquarters, OH, USA.

Castable Wax Resin

A highly accurate material for casting and pressing crowns, bridges, and RPD frameworks

Tested at length by dental technicians, Castable Wax Resin provides accurate, sealed margins — and contains 20% wax for reliable casting with clean burnout. Printed patterns are strong enough to handle with no post-cure required, allowing for a faster, simpler workflow.

Patterns for casting and pressing

Crowns

Removable partial denture frameworks

Bridges



FLCWPU01

Prepared 10/02/2017

Rev. 02 29/04/2024

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Material Properties	METRIC ¹	IMPERIAL ¹	METHOD
	Green ²	Green ²	
Tensile Properties	12 MPa	1680 psi	METHOD
Ultimate Tensile Strength	220 MPa	32 ksi	ASTM D638-10
Tensile Modulus	13%	13%	ASTM D638-10
Elongation at Break	METRIC ¹	IMPERIAL ¹	ASTM D638-10
Burnout Properties	249 °C	480 °F	METHOD
Temp @ 5% Mass Loss			
Ash Content (TGA)	0.0 - 0.1%		

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.

BEGO™ VarseoSmile® TriniQ® Resin

BEGO™VarseoSmile® TriniQ®Resin is a versatile ceramic-filled biocompatible material, indicated for temporary and permanent single units, bridges, and denture teeth.

Permanent Single-units (crown, inlays, onlays, veneers), Bridges (up to 3-units), and Implant Crowns

Temporary Single-units (crown, inlays, onlays, veneers), Bridges (up to 7-units), and Implant Crowns

Denture Teeth for Full and Partial Removable Dentures



BGTQA201

BGTQA301

BGTQB101

Prepared 23/07/2024

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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.

Mechanical Properties ^{1,2}	POST-CURED	METHOD
Flexural Strength	120 MPa	ISO 10477:2020
Flexural Modulus	3600 MPa	ISO 10477:2020
Hardness	≥ 90 D	ISO 868:2003
Sorption	< 0.6 µg/mm ³	ISO 10477:2020
Solubility	< 12 µg/mm ³	ISO 10477:2020
Density @ 20 °C	1.29 g/cm ³	-
Viscosity @ 22 °C	3300 cP	-

BEGO™ VarseoSmile® TriniQ® Resin has been evaluated in accordance with ISO 10993-1, Biological evaluation of medical devices - Part 1: Evaluation and testing within a risk management process, and ISO 7405, Dentistry - Evaluation of biocompatibility of medical devices used in dentistry, and passed the requirements for the following biocompatibility risks:

ISO Standard	Description
ISO 10993-1:2018	Biological safety confirmed
ISO 10993-5:2009	Not cytotoxic
ISO 10993-10:2010	Not a sensitizer
ISO 10993-18:2009	No critical observations
ISO 10993-23:2021	Not an irritant

The product was developed and is in compliance with the following ISO Standards:

ISO Standard	Description
EN ISO 13485	Medical Devices – Quality Management Systems – Requirements for Regulatory Purposes
EN ISO 14971	Medical Devices – Application of Risk Management to Medical Devices

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 verified and validated by BEGO™ for compatible Formlabs equipment using post-processing instructions listed in the BEGO™ VarseoSmile® TriniQ® Resin Instructions for Use.

BioMed Clear Resin

BioMed Clear Resin is a rigid material for biocompatible applications requiring long-term skin or mucosal membrane contact. This USP Class VI certified material is suitable for applications that require wear resistance and low water absorption over time.

Parts printed with BioMed Clear Resin are compatible with common sterilization methods. BioMed Clear Resin is manufactured in our ISO 13485 facility and is supported with an FDA Device Master File.



V1 FLBMCL01

In order to achieve biocompatible final parts, you must follow the recommended printing and post-processing outlined in the [manufacturing guide](#).



Prepared 06/12/2020

Rev. 04 28/04/2025

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	METRIC ¹	IMPERIAL ¹	METHOD
	Post-Cured ²	Post-Cured ²	
Tensile Properties	METRIC ¹	IMPERIAL ¹	METHOD
Ultimate Tensile Strength	52 MPa	7.5 ksi	ASTM D638-10 (Type IV)
Young's Modulus	2080 MPa	302 ksi	ASTM D638-10 (Type IV)
Elongation at Break	12%		ASTM D638-10 (Type IV)
Flexural Properties	METRIC ¹	IMPERIAL ¹	METHOD
Flexural Strength	84 MPa	12.2 ksi	ASTM D790-15 (Method B)
Flexural Modulus	2300 MPa	332 ksi	ASTM D790-15 (Method B)
Hardness Properties	METRIC ¹	IMPERIAL ¹	METHOD
Hardness Shore D	78D		ASTM D2240-15 (Type D)
Impact Properties	METRIC ¹	IMPERIAL ¹	METHOD
Notched Izod	35 J/m	0.658 ft-lb/in	ASTM D256-10 (Method A)
Unnotched Izod	449 J/m	8.41 ft-lb/in	ASTM D4812-11
Thermal Properties	METRIC ¹	IMPERIAL ¹	METHOD
Heat Deflection Temp. @ 1.8 MPa	54 °C	129 °F	ASTM D648-18 (Method B)
Heat Deflection Temp. @ 0.45 MPa	67 °C	152 °F	ASTM D648-18 (Method B)
Coefficient of Thermal Expansion	82 µm/m/°C	45 µin/in/°F	ASTM E831-14
Other Properties	METRIC ¹	IMPERIAL ¹	METHOD
Water Absorption	0.54%		ASTM D570-98 (2018)

Sterilization Compatibility

E-beam	35 kGy E-beam radiation
Ethylene Oxide	100% Ethylene oxide at 55 °C for 180 minutes
Gamma	29.4 - 31.2 kGy gamma radiation
Steam Sterilization	Autoclave at 134 °C for 20 minutes Autoclave at 121 °C for 30 minutes

For more details on sterilization compatibilities, visit formlabs.com/medical

Disinfection Compatibility

Chemical Disinfection	70% Isopropyl Alcohol for 5 minutes
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Samples printed with BioMed Clear Resin have been evaluated in accordance with ISO 10993-1:2018, ISO 7405:2018, ISO 18562-1:2017 and have passed the requirements associated with the following biocompatibility endpoints:

ISO Standard	Description ³	ISO Standard	Description ³
ISO 10993-5:2009	Not cytotoxic	ISO 10993-3:2014	Not mutagenic
ISO 10993-10:2010/(R)2014	Not an irritant	ISO 18562-2:2017	Does not emit particulates
ISO 10993-10:2010/(R)2014	Not a sensitizer	ISO 18562-3:2017	Does not emit VOCs
ISO 10993-17:2002,	Not toxic (subacute / subchronic)	ISO 18562-4:2017	Does not emit hazardous water-soluble substances
ISO 10993-18:2005	No evidence of acute systemic toxicity	ISO 10993-11: 2017/USP, General Chapter <151>, Pyrogen Test	Non-pyrogenic
ISO 10993-11: 2017			

The product was developed and is in compliance with the following ISO Standards:

ISO Standard	Description
EN ISO 13485:2016	Medical Devices – Quality Management Systems – Requirements for Regulatory Purposes
EN ISO 14971:2012	Medical Devices – Application of Risk Management to Medical Devices

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

² Data were measured on post-cured samples printed on a Form 3B printer with 100 µm BioMed Clear Resin settings, washed in a Form Wash for 20 minutes in 99% isopropyl alcohol, and post-cured at 60 °C for 60 minutes in a Form Cure.

³ BioMed Clear Resin was tested at NAMSA World Headquarters, OH, USA.

BioMed Amber Resin

BioMed Amber Resin is a rigid material for biocompatible applications requiring short-term contact. Parts printed with BioMed Amber Resin are compatible with common solvent disinfection and sterilization methods. BioMed Amber Resin is manufactured in our ISO13485 facility.

Medical devices and device components

Research and development

Surgical planning and implant sizing tools



V1 **FLBMAM01**

Prepared 11/04/2019

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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.

Material Properties	METRIC ¹	IMPERIAL ¹	METHOD
	Post-Cured ²	Post-Cured ²	
Tensile Properties	METRIC ¹	IMPERIAL ¹	METHOD
Ultimate Tensile Strength	73 MPa	11 ksi	ASTM D638-10 (Type IV)
Young's Modulus	2900 MPa	420 ksi	ASTM D638-10 (Type IV)
Elongation at Break	12%		ASTM D638-10 (Type IV)
Flexural Properties	METRIC ¹	IMPERIAL ¹	METHOD
Flexural Strength	103 MPa	15 ksi	ASTM D790-15 (Method B)
Flexural Modulus	2500 MPa	363 ksi	ASTM D790-15 (Method B)
Hardness Properties	METRIC ¹	IMPERIAL ¹	METHOD
Hardness Shore D	67 D		ASTM D2240-15 (Type D)
Impact Properties	METRIC ¹	IMPERIAL ¹	METHOD
Notched Izod	28 J/m	0.53 ft-lb/in	ASTM D4812-11
Unnotched Izod	142 J/m	2.6 ft-lb/in	ASTM D648-18 (Method B)
Thermal Properties	METRIC ¹	IMPERIAL ¹	METHOD
Heat Deflection Temp. @ 1.8 MPa Heat	65 °C	149 °F	ASTM D648-18 (Method B)
Deflection Temp. @ 0.45 MPa	78 °C	172 °F	ASTM E831-14
Coefficient of Thermal Expansion	66 µm/m/°C	37 µin/in/°F	

Sterilization Compatibility

E-beam	35 kGy E-beam radiation
Ethylene Oxide	100% Ethylene oxide at 55 °C for 180 minutes
Gamma	29.4 - 31.2 kGy gamma radiation
Steam Sterilization	Autoclave at 134 °C for 20 minutes Autoclave at 121 °C for 30 minutes

For more details on sterilization compatibilities, visit formlabs.com/medical

Disinfection Compatibility

Chemical Disinfection	70% Isopropyl Alcohol for 5 minutes
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BioMed Amber Resin has been evaluated in accordance with ISO 10993-1:2018, Biological evaluation of medical devices - Part 1: Evaluation and testing within a risk management process, and ISO 7405:2009/(R)2015, Dentistry - Evaluation of biocompatibility of medical devices used in dentistry, and passed the requirements for the following biocompatibility risks:

ISO Standard	Description ³	ISO Standard	Description ³
ISO 10993-5:2009	Not cytotoxic	ISO 10993-11: 2017	No evidence of acute systemic toxicity
ISO 10993-10:2010/(R)2014	Not an irritant	ISO 10993-11: 2017/USP, General Chapter <151>, Pyrogen Test	Non-pyrogenic
ISO 10993-10:2010/(R)2014	Not a sensitizer		

The product was developed and is in compliance with the following ISO Standards:

ISO Standard	Description
EN ISO 13485:2016	Medical Devices – Quality Management Systems – Requirements for Regulatory Purposes
EN ISO 14971:2012	Medical Devices – Application of Risk Management to Medical Devices

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 and Form 3B (impact and thermal measurements) printers with 100 µm BioMed Amber Resin settings, washed in a Form Wash for 20 minutes in 99% Isopropyl Alcohol, and post-cured at 60 °C for 30 minutes in a Form Cure.

³ BioMed Amber Resin was tested at NAMSA World Headquarters, OH, USA.

BioMed White Resin

Medical-grade white material for 3D printing rigid, biocompatible parts

BioMed White Resin is an opaque white material for biocompatible applications requiring long-term skin contact or short-term mucosal contact. Unique in our portfolio, this medical-grade material is also USP <151> Pyrogen and Acute Systemic Toxicity tested and can be used in applications with short-term tissue, bone, dentin contact.

Parts printed with BioMed White Resin are compatible with common solvent disinfection and sterilization methods. BioMed White Resin is manufactured in our ISO 13485 facility and is also USP Class VI certified which makes it suitable for pharmaceutical and drug delivery applications.

Surgical guides and templates

Biocompatible molds, jigs, and fixtures



FLBMWH01

Prepared 03/30/2022

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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.

Material Properties	METRIC ¹	IMPERIAL ¹	METHOD
	Post-Cured ²	Post-Cured ²	
Tensile Properties	METRIC ¹	IMPERIAL ¹	METHOD
Ultimate Tensile Strength	46 MPa	6640 psi	ASTM D638-14 (Type IV)
Young's Modulus	2000 MPa	293 ksi	ASTM D638-14 (Type IV)
Elongation at Break	10%		ASTM D638-14 (Type IV)
Flexural Properties	METRIC ¹	IMPERIAL ¹	METHOD
Flexural Stress at 5% Strain	74 MPa	10800 psi	ASTM D790-15 (Procedure B)
Flexural Modulus	2020.16 MPa	293 ksi	ASTM D790-15 (Procedure B)
Hardness Properties	METRIC ¹	IMPERIAL ¹	METHOD
Hardness Shore D	80 D	-	ASTM D2240-15 (Type D)
Impact Properties	METRIC ¹	IMPERIAL ¹	ASTM D256-10 (Method A)
Notched Izod	15 J/m	0.283 ft-lb/in	ASTM D4812-11
Unnotched Izod	269 J/mm	5.04 ft-lb/in	METHOD
Thermal Properties	METRIC ¹	IMPERIAL ¹	ASTM D648-18 (Method B)
Heat Deflection Temp. @ 1.8 MPa	52.4 °C	-	ASTM D648-18 (Method B)
Heat Deflection Temp. @ 0.45 MPa	67.0 °C	-	METHOD
Coefficient of Thermal Expansion	90.1 µm/m/°C	-	
Other Properties	METRIC ¹	IMPERIAL ¹	
Water Absorption	0.40 wt%	-	ASTM D570-98

Sterilization Compatibility

E-beam	35 kGy E-beam radiation
Ethylene Oxide	100% Ethylene oxide at 55 °C for 180 minutes
Gamma	29.4 - 31.2 kGy gamma radiation
Steam Sterilization	Autoclave at 134 °C for 20 minutes Autoclave at 121 °C for 30 minutes

For more details on sterilization compatibilities, visit formlabs.com/medical

Disinfection Compatibility

Chemical Disinfection	70% Isopropyl Alcohol for 5 minutes
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Samples printed with BioMed White Resin have been evaluated in accordance with the following biocompatibility endpoints:

ISO Standard	Description ³
ISO 10993-5:2009	Not cytotoxic
ISO 10993-10:2010/(R)2014	Not an irritant
ISO 10993-10:2010/(R)2014	Not a sensitizer
ISO 10993-11: 2017	No evidence of acute systemic toxicity
ISO 10993-11: 2017/ USP, General Chapter <151>, Pyrogen Test	Non-pyrogenic

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

² Data were measured on post-cured samples printed on a Form3B with 100µm BioMed White Resin settings, washed in a Form Wash for 5 minutes in 99% Isopropyl Alcohol, and post-cured at 60°C, 60 minutes in a Form Cure.

³ BioMed White Resin was tested at NAIMSA World Headquarters, OH, USA.

The product was developed and is in compliance with the following ISO Standards:

ISO Standard	Description
EN ISO 13485:2016	Medical Devices – Quality Management Systems – Requirements for Regulatory Purposes
EN ISO 14971:2012	Medical Devices – Application of Risk Management to Medical Devices

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	Mineral oil, heavy	< 0.1
Acetone	2.9	Mineral oil, light	< 0.1
Bleach ~5% NaOCl	0.3	Salt Water (3.5% NaCl)	0.4
Butyl Acetate	0.4	Skydrol 5	0.5
Diesel Fuel	< 0.1	Sodium hydroxide solution (0.025% pH = 10)	0.3
Diethyl glycol monomethyl ether	1.0	Strong Acid (HCl Conc)	0.2
Hydraulic Oil	< 0.1	TPM	0.6
Hydrogen peroxide (3%)	0.3	Water	0.3
Isooctane	< 0.1	Xylene	0.3
Isopropyl Alcohol	0.2		

BioMed Black Resin

Medical-grade matte black material for 3D printing rigid, biocompatible parts

BioMed Black Resin is a matte, opaque material for biocompatible applications requiring long-term skin contact or short-term mucosal membrane contact. This medical-grade material is suitable for applications that require high contrast for visualization, excellent definition and smooth surface quality.

Parts printed with BioMed Black Resin are compatible with common solvent disinfection and sterilization methods. BioMed Black Resin is manufactured in our ISO 13485 facility and is also USP Class VI certified which makes it suitable for pharmaceutical and drug delivery applications.

Medical devices and device components

Biocompatible molds, jigs, and fixtures

End-use parts requiring patient contact

Consumer goods



FLBMBL01

Prepared 03/30/2022

Rev. 01 03/30/2022

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.

Material Properties	METRIC ¹	IMPERIAL ¹	METHOD
	Post-Cured ²	Post-Cured ²	
Tensile Properties	METRIC ¹	IMPERIAL ¹	METHOD
Ultimate Tensile Strength	36 MPa	5180 psi	ASTM D638-14 (Type IV)
Young's Modulus	1500 MPa	221 ksi	ASTM D638-14 (Type IV)
Elongation at Break	14%		ASTM D638-14 (Type IV)
Flexural Properties	METRIC ¹	IMPERIAL ¹	METHOD
Flexural Stress at 5% Strain	57 MPa	8290 psi	ASTM D790-15 (Procedure B)
Flexural Modulus	1600 MPa	242 ksi	ASTM D790-15 (Procedure B)
Hardness Properties	METRIC ¹	IMPERIAL ¹	METHOD
Hardness Shore D	77 D	-	ASTM D2240-15 (Type D)
			ASTM D256-10 (Method A)
Impact Properties	METRIC ¹	IMPERIAL ¹	METHOD
Notched Izod	25 J/m	0.464 ft-lb/in	ASTM D4812-11
Unnotched Izod	348 J/m	6.52 ft-lb/in	
Thermal Properties	METRIC		METHOD
Heat Deflection Temp. @ 1.8 MPa			ASTM D648-18 (Method B)
	¹	IMPERIAL ¹	ASTM D648-18 (Method B)
Heat Deflection Temp. @ 0.45 MPa	49.4 °C	-	ASTM E831-13
Coefficient of Thermal Expansion	67.9 °C	-	
	106.9 µm/m/°C	-	METHOD
Other Properties	METRIC ¹	IMPERIAL ¹	
Water Absorption	0.44 wt%	-	ASTM D570-98

Sterilization Compatibility

E-beam	35 kGy E-beam radiation
Ethylene Oxide	100% Ethylene oxide at 55 °C for 180 minutes
Gamma	29.4 - 31.2 kGy gamma radiation
Steam Sterilization	Autoclave at 134 °C for 20 minutes Autoclave at 121 °C for 30 minutes

For more details on sterilization compatibilities, visit formlabs.com/medical

Disinfection Compatibility

Chemical Disinfection	70% Isopropyl Alcohol for 5 minutes
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Samples printed with BioMed Black Resin have been evaluated in accordance with the following biocompatibility endpoints:

ISO Standard	Description ³
ISO 10993-5:2009	Not cytotoxic
ISO 10993-10:2010/(R)2014	Not an irritant
ISO 10993-10:2010/(R)2014	Not a sensitizer

The product was developed and is in compliance with the following ISO Standards:

ISO Standard	Description
EN ISO 13485:2016	Medical Devices – Quality Management Systems – Requirements for Regulatory Purposes
EN ISO 14971:2012	Medical Devices – Application of Risk Management to Medical Devices

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

² Data were measured on post-cured samples printed on a Form3B with 100µm BioMed Black Resin settings, washed in a Form Wash for 5 minutes in 99% Isopropyl Alcohol, and post-cured at 70°C, 60 minutes in a Form Cure.

³ BioMed Black Resin was tested at NAMSA World Headquarters, OH, USA.

BioMed Durable Resin

BioMed Durable Resin is a clear material for biocompatible applications requiring impact, shatter, and abrasion resistance. This USP Class VI material is made in an FDA-registered, ISO13485 facility and can be used in applications for long-term skin (>30 days), and short-term tissue, bone, and dentin contact (<24hrs)

Other biocompatibility endpoints have not been evaluated and may be added over time.

End-Use Devices and Components Requiring Biocompatibility and Impact Resistance

Patient-Specific Instruments

Single-Use Instruments



V1 FLBMDU01

V1.1 FLDUCL21

Prepared 19/05/2023

Rev. 02 26/06/2023

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	METRIC ¹	IMPERIAL ¹	METHOD
	Post-Cured ²	Post-Cured ²	
Tensile Properties	METRIC ¹	IMPERIAL ¹	METHOD
Ultimate Tensile Strength	29.1 MPa	4230 psi	ASTM D638-14 (Type IV)
Young's Modulus	994 MPa	144 ksi	ASTM D638-14 (Type IV)
Elongation at Break	33%		ASTM D638-14 (Type IV)
Flexural Properties	METRIC ¹	IMPERIAL ¹	METHOD
Flexural Stress at 5% Strain	21 MPa	92 ksi	ASTM D790-15 (Procedure B)
Flexural Modulus	643 MPa	3070 psi	ASTM D790-15 (Procedure B)
Hardness Properties	METRIC ¹	IMPERIAL ¹	METHOD
Hardness Shore D	75D		ASTM D2240-15 (Type D)
Impact Properties	METRIC ¹	IMPERIAL ¹	ASTM D256-10 (Method A)
Notched Izod	98 J/m	1.84 ft-lb/in	ASTM D4812-11
Unnotched Izod	1340 J/m	25.1 ft-lb/in	METHOD
Thermal Properties	METRIC ¹	IMPERIAL ¹	ASTM D648-18 (Method B)
Heat Deflection Temp. @ 1.8 MPa	40 °C	104 °F	ASTM D648-18 (Method B)
Heat Deflection Temp. @ 0.45 MPa	46 °C	115 °F	ASTM E831-13
Coefficient of Thermal Expansion	102.9 um/m/°C		

Sterilization Compatibility

For details on sterilization compatibilities, visit formlabs.com/medical

Disinfection Compatibility

Chemical Disinfection	70% Isopropyl Alcohol for 5 minutes
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Samples printed with BioMed Durable Resin have been evaluated in accordance with the following biocompatibility endpoints:

ISO Standard	Description ³	ISO Standard	Description ³
EN ISO 10993-5:2009	Not cytotoxic	ISO 10993-11: 2017	No evidence of acute systemic toxicity
ISO 10993-10:2010/(R)2014	Not an irritant	ISO 10993-11: 2017/USP, General Chapter <151>, Pyrogen Test	Non-pyrogenic
ISO 10993-10:2010/(R)2014	Not a sensitizer	USP <88> Biological Reactivity Tests, In-vivo	USP Class VI Certified

The product was developed and is in compliance with the following ISO Standards:

ISO Standard	Description
EN ISO 13485:2016	Medical Devices – Quality Management Systems – Requirements for Regulatory Purposes
EN ISO 14971:2012	Medical Devices – Application of Risk Management to Medical Devices

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

² Data were measured on post-cured samples printed on a Form 3B with 100um BioMed Durable Resin settings, washed in a Form Wash for 10 minutes in 99% Isopropyl Alcohol, and post-cured at 60°C, 20 minutes in a Form Cure.

³ BioMed Durable 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%	0.7	Mineral oil, heavy	0.1
Acetone	12.4	Mineral oil, light	0.1
Bleach ~5% NaOCl	0.5	Salt Water (3.5% NaCl)	0.5
Butyl Acetate	5.0	Skydrol 5	0.6
Diesel Fuel	0.1	Sodium hydroxide solution (0.025% pH = 10)	0.5
Diethyl glycol monomethyl ether	3.0	Strong Acid (HCl Conc)	0.7
Hydraulic Oil	0.2	TPM	1.1
Hydrogen peroxide (3%)	0.6	Water	0.5
Isooctane	0.02	Xylene	4.8
Isopropyl Alcohol	2.0		

BioMed Flex 80A Resin

For Flexible, Biocompatible, Transparent Medical Devices and Models

BioMed Flex 80A Resin is a firm, flexible, medical-grade material for applications requiring durability, biocompatibility, and transparency. This ISO 10993 and USP Class VI certified material is made in an FDA-registered, ISO 13485 facility and can be used in applications for long-term skin (> 30 days), and short-term mucosal membrane contact (<24hrs).

Flexible Biocompatible Medical Devices

Firm Tissue Models to Assist in Surgeries



V1 **FLBMFL01**

Prepared 20/09/2023

Rev. 01 20/09/2023

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	METRIC ¹	IMPERIAL ¹	METHOD
	Post-Cured ²	Post-Cured ²	
Mechanical Properties	METRIC ¹	IMPERIAL ¹	METHOD
Ultimate Tensile Strength ³	7.2 MPa	1040 psi	ASTM D412-06 (A)
Stress at 50% Elongation	2.6 MPa	377 psi	ASTM D412-06 (A)
Stress at 100% Elongation Elongation at	4.5 MPa	653 psi	ASTM D412-06 (A)
Break	135 %		ASTM D412-06 (A)
Tear Strength ⁴	22 kN/m	125 lb/in	ASTM D624-00
Shore Hardness	77 - 80A		ASTM 2240
Compression Set 23 °C for 22 hours	24.7%		ASTM D395-03 (B)
Compression Set 70 °C for 22 hours	5.3%		ASTM D395-03 (B)
Bayshore Resilience	29%		ASTM D2632
Thermal Properties	METRIC ¹	IMPERIAL ¹	METHOD
Glass transition temperature (Tg)	37 °C	99 °F	DMA

Disinfection Compatibility

Chemical Disinfection	70% Isopropyl Alcohol for 5 minutes
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Samples printed with BioMed Flex 80A Resin have been evaluated in accordance with the following biocompatibility endpoints:

ISO Standard	Description ³
ISO 10993-5:2009	Met requirements of test
ISO 10993-23:2021	Met requirements of test
ISO 10993-10:2021	Met requirements of test
USP <88> Biological Reactivity Tests, In-vivo	USP Class VI Certified

The product was developed and is in compliance with the following ISO Standards:

ISO Standard	Description
EN ISO 13485:2016	Medical Devices – Quality Management Systems – Requirements for Regulatory Purposes
EN ISO 14971:2012	Medical Devices – Application of Risk Management to Medical Devices

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

² Data was obtained from parts printed using form 3B, 100 µm, BioMed Flex 80A Resin settings, and using the BioMed Flex 80A MFG guide.

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%	1.42	Isooctane (aka gasoline)	9
Acetone	65.3	Mineral oil (light)	0.4
Isopropyl Alcohol	25.9	Mineral oil (Heavy)	0.2
Bleach ~5% NaOCl	0.5	Salt Water (3.5% NaCl)	0.5
Butyl Acetate	97.5	Sodium Hydroxide solution (0.025% PH 10)	0.6
Diesel Fuel	5.1	Water	0.6
Diethyl Glycol Monomethyl Ether	30.9	Xylene	1 12.5
Hydraulic Oil	2.5	Strong Acid (HCl conc)	37.3
Skydrol 5	28.1	Tripropylene Glycol Methyl Ether (TPM)	31.2
Hydrogen peroxide (3%)	0.7		

BioMed Elastic 50A Resin

BioMed Elastic50A Resin is a soft, elastic, medical grade material for applications requiring comfort, biocompatibility and transparency. This ISO 10993 and USP Class VI certified material is made in an FDA-registered, ISO 13485 facility and can be used in applications for long-term skin contact (> 30 days), and short-term mucosal membrane contact (< 24hrs).

Elastic Biocompatible Medical Devices

Soft Tissue Models to Assist in Surgeries



V1 **FLBME01**

Prepared 20/09/2023

Rev. 02 24/06/2024

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	METRIC ¹	IMPERIAL ¹	METHOD
	Post-Cured ²	Post-Cured ²	
Mechanical Properties	METRIC ¹	IMPERIAL ¹	METHOD
Ultimate Tensile Strength ³	2.3 MPa	339 psi	ASTM D412-06 (A)
Stress at 50% Elongation	1 MPa	145 psi	ASTM D412-06 (A)
Stress at 100% Elongation Elongation at Break	1.3 MPa	189 psi	ASTM D412-06 (A)
Tear Strength ⁴	11 kN/m	60.8 lb/in	ASTM D624-00
Shore Hardness	50A		ASTM 2240
Compression Set 23 °C for 22 hours	8%		ASTM D395-03 (B)
Compression Set 70 °C for 22 hours	11%		ASTM D395-03 (B)
Bayshore Resilience	15%		ASTM D2632
Thermal Properties	METRIC ¹	IMPERIAL ¹	METHOD
Glass transition temperature (Tg)	-36 °C	-32.8 °F	DMA

Disinfection Compatibility

Chemical Disinfection	70% Isopropyl Alcohol for 5 minutes
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Samples printed with BioMed Elastic 50A Resin have been evaluated in accordance with the following biocompatibility endpoints:

ISO Standard	Description ³
ISO 10993-5:2009	Met requirements of test
ISO 10993-23:2021	Met requirements of test
ISO 10993-10:2021	Met requirements of test
USP <88> Biological Reactivity Tests, In-vivo	USP Class VI Certified

The product was developed and is in compliance with the following ISO Standards:

ISO Standard	Description
EN ISO 13485:2016	Medical Devices – Quality Management Systems – Requirements for Regulatory Purposes
EN ISO 14971:2012	Medical Devices – Application of Risk Management to Medical Devices

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

² Data was obtained from parts printed using form 30, 100 µm, BioMed Elastic 50A settings, and using the BioMed Elastic 50A MFG guide.

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%	1.5	Isooctane (aka gasoline)	15.6
Acetone	43.4	Mineral oil (light)	0.7
Isopropyl Alcohol	39.2	Mineral oil (Heavy)	0.4
Bleach ~5% NaOCl	0.6	Salt Water (3.5% NaCl)	0.6
Butyl Acetate	133.1	Sodium Hydroxide solution (0.025% PH 10)	0.7
Diesel Fuel	7.9	Water	0.7
Diethyl Glycol Monomethyl Ether	31.4	Xylene	163.9
Hydraulic Oil	3.9	Strong Acid (HCl conc)	45.6
Skydrol 5	41.2	Tripropylene Glycol Methyl Ether (TPM)	43.6
Hydrogen peroxide (3%)	0.9		