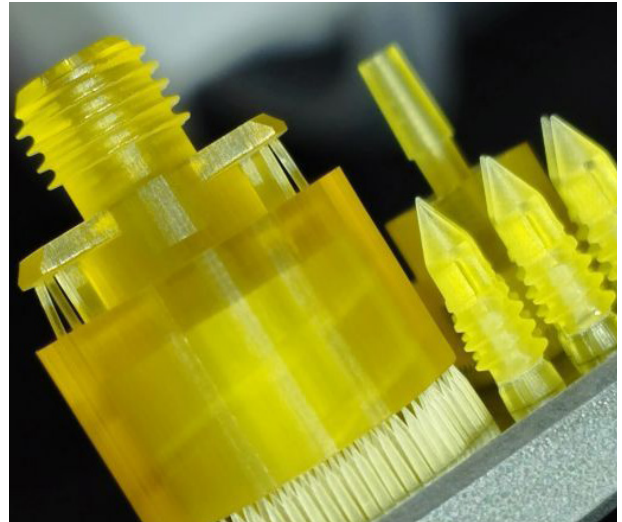


## Micro 3D Printing material comparison

In this datasheet, we compare the properties of Matrix HTL and Matrix BIO materials and look at the design features for Micro 3D Printing.

**Matrix HTL** is a high performance engineering material with high strength, rigidity, and heat resistance, able to withstand temperatures up to 140C. Matrix HTL enables high resolution features, making it suitable for a broad range of engineering and medical applications including those which require autoclave sterilisation.

**Matrix BIO** is a biocompatible resin suitable for non-implantable medical applications. Matrix BIO can undergo sterilisation and has passed numerous ISO 10993 biocompatibility tests for skin irritation and sensitisation, toxicity, cytotoxicity, pyrogenicity, and in vitro hemolysis.



Material properties		Cured parts		Standard
		Matrix HTL	Matrix BIO	
Tensile Properties	Tensile Strength	71.5 MPa	56.0 MPa	ASTM D638
	Tensile Modulus	2397 MPa	1614 MPa	ASTM D638
	Elongation at Break	7.8%	6.2%	ASTM D638
Flexural Properties	Flexural Strength	112.9 MPa	106.6 MPa	ASTM D790
	Flexural Modulus	2.8 GPa	3.5 GPa	ASTM D790
Impact Properties	Impact Strength	30 J/m		ASTM D256
Thermal Properties	CTE @ 60C	169.0 µm/m/°C	170.3 µm/m/°C	-
	HDT @ 0.45 MPa	114.2°C	85.7°C	ASTM D648 - 07
General properties	Contact Angle	45-60°	50-70°	ASTM D7334
	Water Absorption (24h)	1.05%	0.69%	ASTM D570
	Dialectic Constant (10 GHz)	3.45	2.75	-
	DF	0.0245	0.0458	-
	Hardness	81 Shore D	84 Shore D	ASTM D785
	Viscosity	85 cP	300 cP	-
	Standard Colour	Black / Carbon black / Yellow	Yellow trans	-
	Cell Culture Survival Rate In Vitro	-	75%	-

<sup>1</sup> Final properties are dependent on print conditions, post-processing operations, and part geometry.

<sup>2</sup> Test samples were UV cured and heat cured.

# Micro 3D Printing materials

ISO Standards for Matrix BIO

ISO Standard	Test Description
ISO 10993-10: 2010; ISO 10993-12: 2012; ISO 10993-2: 2006	Skin Irritation Test
ISO 10993-10: 2010; ISO 10993-12: 2012; ISO 10993-12: 2006	Skin Sensitisation Test
ISO 10993-4: 2017	In Vitro Hemolytic Test
ISO 10993-11: 2017; ISO 10993-12: 2012; ISO 10993-2: 2006	Pyrogen Test
ISO 10993-5: 2009; ISO 10993-12: 2012	In Vitro Cytotoxicity Test
ISO 10993-11: 2017; ISO 10993-12: 2012; ISO 10993-2: 2006	Acute Systemic Toxicity Test



Design features for Micro 3D Printing

Design feature	Recommended
Maximum part size	100 x 100 x 75 mm
Minimum part size	1 mm <sup>3</sup>
Minimum feature size	0.05 mm
Minimum hole diameter (vertical)	0.05 mm
Minimum hole diameter (horizontal)	0.15 mm
Maximum unsupported hole diameter (horizontal)	2.0 mm
Minimum wall thickness (supported)	0.05 mm
Minimum wall thickness (unsupported)	0.1 mm
Minimum unsupported overhang angle	30°
Maximum bridged overhang length	1.5 mm
Maximum non-bridged overhang length	0.3 mm
Aspect ratio for channels	100:01:00
Aspect ratio for pins & pillars	40:01:00
Minimum feature clearance	0.1 mm
Recommended channel shape > Ø 100 µm	Rectangular or circular
Recommended channel shape < Ø 100 µm	Circular
Part-to-part spacing	0.1 mm
Layer height	0.01-0.05 mm
Support structure shape	Cone
Support structure cone top diameter	0.08-0.2 mm
Support structure cone base diameter	0.1-1 mm



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