

# TPU 90A Powder

## A Tough SLS Elastomer for Resilient, Skin-Safe Products

Create flexible TPU parts with unmatched design freedom and ease. Balancing high elongation at break and superior tear strength, TPU 90A Powder enables you to produce flexible, skin-safe prototypes and end-use parts that withstand the demands of everyday use – all at a low cost per part thanks to a 20% refresh rate.

*TPU 90A Powder is specifically developed for use on Fuse Series printers.*

**Wearables and soft-touch elements**

**Gaskets, seals, masks, belts, plugs, and tubes**

**Padding, dampers, cushions, and grippers**

**Soles, splints, orthotics, and prosthetics**

**Protective sports equipment**



**FLTP9G01**

\* May not be available in all regions

**Prepared** 03 . 14 . 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.

**Rev.** 01 03 . 14 . 2023

# MATERIAL PROPERTIES DATA

# TPU 90A Powder

	METRIC <sup>1,2</sup>	IMPERIAL <sup>1,2</sup>	METHOD
<b>Mechanical Properties</b>			
Ultimate Tensile Strength (X/Y)	8.7 MPa	1260 PSI	ASTM D412-16, Method A
Ultimate Tensile Strength (Z)	7.2MPa	1050 PSI	ASTM D412-16, Method A
Elongation at Break (X/Y)	310%		ASTM D412-16, Method A
Elongation at Break (Z)	110%		ASTM D412-16, Method A
Stress @ 50% Elongation (X/Y)	6.1 MPa	889 PSI	ASTM D412-16, Method A
Stress @ 50% Elongation (Z)	5.9 MPa	860 PSI	ASTM D412-16, Method A
Stress @ 100% Elongation (X/Y)	7.2 MPa	1050 PSI	ASTM D412-16, Method A
Stress @ 100% Elongation (Z)	7.0 MPa	1020 PSI	ASTM D412-16, Method A
Tear Resistance (X/Y)	66 kN/m	378 lbf/in	ASTM D624-00 (2020)
Tear Resisitance (Z)	39 kN/m	247 lbf/in	ASTM D624-00 (2020)
Compression Set (23°C)	20.5%		ASTM D395-18, Method B
Compression Set (70°C)	59.9%		ASTM D395-18, Method B
Shore Hardness	90A		ASTM D2240-15 (2021)
Tabor Abrasion	122mm <sup>3</sup>	7 x 10 <sup>-3</sup> in <sup>3</sup>	ISO 4649 (40rpm, 10N load)

## Thermal Properties

Vicat Softening Temperature	94.3 °C	201.7 °F	ASTM D 1525
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## Other Properties

Moisture Content (powder)	0.19%		ISO 15512 Method D
Water Absorption (Printed Part)	0.89%		ASTM D570
Bulk Density (Sintered)	1.14 g/cm <sup>3</sup>	71.2 lb/ft <sup>3</sup>	In-house method

Samples printed with TPU 90A powder have been evaluated in accordance with ISO 10993-1:2018, and has passed the requirements for the following biocompatibility risks:

ISO Standard	Result <sup>3,4</sup>
ISO 10993-5: 2009	Non-cytotoxic
ISO 10993-23:2021	Non-irritant
ISO 10993-10:2021	Non-sensitizer

## 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%	1.3	Isooctane (aka gasoline)	0.7
Acetone	28.6	Mineral oil (light)	2.3
Isopropyl Alcohol	4.8	Mineral oil (Heavy)	2.1
Bleach ~5% NaOCl	0.8	Salt Water (3.5% NaCl)	0.9
Butyl Acetate	16.5	Sodium Hydroxide solution (0.025% PH 10)	0.9
Diesel Fuel	2.0	Water	0.9
Diethyl glycol Monomethyl Ether	14.4	Xylene	20.8
Hydraulic Oil	2.8	Strong Acid (HCl conc)	- 5.2
Skydrol 5	6.5	TPM	9.9
Hydrogen peroxide (3%)	1.0		

<sup>1</sup> Material properties may vary with part geometry, print orientation and temperature.

<sup>2</sup> Results on Fuse 1 and Fuse 1+ 30W are equivalent within the bounds of experimental uncertainty

<sup>3</sup> Material properties may vary based on part design and manufacturing practices. It is the manufacturer's responsibility to validate the suitability of the printed parts for the intended use.

<sup>4</sup> TPU 90A was tested at NAMS World Headquarters, OH, USA.