

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

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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

| Mechanical Properties | METRIC ^{1,2} | IMPERIAL ^{1,2} | METHOD |
|---------------------------------|------------------------|--------------------------------------|----------------------------|
| 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 lb/in | ASTM D624-00 (2020) |
| Tear Resistance (Z) | 39 kN/m | 247 lb/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) |
| Taber Abrasion | 122 mm ³ | 7 x 10 ⁻³ in ³ | ISO 4649 (40rpm, 10N load) |
| Thermal Properties | METRIC ^{1,2} | IMPERIAL ^{1,2} | METHOD |
| Vicat Softening Temperature | 94.3 °C | 201.7 °F | ASTM D1525 |
| Other Properties | METRIC ^{1,2} | IMPERIAL ^{1,2} | METHOD |
| Moisture Content (powder) | 0.19% | | ISO 15512 Method D |
| Water Absorption (Printed Part) | 0.89% | | ASTM D570 |
| Bulk Density (Sintered) | 1.14 g/cm ³ | 71.2 lb/ft ³ | 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 ^{3,4} |
|-------------------|-----------------------|
| ISO 10993-5: 2009 | Non-cytotoxic |
| ISO 10993-23:2021 | Non-irritant |
| ISO 10993-10:2021 | Non-sensitizer |

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

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

³ 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.

⁴ TPU 90A was tested at NAMSA World Headquarters, OH, USA.

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 | | |