

Nylon 12 Tough

A highly ductile and dimensionally accurate nylon powder.

Nylon 12 Tough Powder offers the best-in-class refresh rate among Nylon powders, high ductility, and great dimensional accuracy across the build chamber. Print more durable parts for prototyping and small batch production that have reduced warpage without sacrificing strength.

For best results, Nylon 12 Tough Powder is required to undergo a powder aging process prior to first build. Nylon 12 Tough Powder is specifically developed for use on the Fuse 1+ 30W printer.



Material properties testing was completed with parts printed using aged powder on a bed temperature tuned printer. Scan the QR Codes to learn more about Powder Aging and Bed Temperature Tuning.

Powder
Aging



Temperature
Tuning



FLP12T01

Prepared 08/10/2024

Rev. 01 08/10/2024

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.

Mechanical Properties	METRIC	IMPERIAL	METHOD
Ultimate Tensile Strength	42 MPa	6200 psi	ASTM D638-14 Type 1
Tensile Modulus	1450 MPa	215 ksi	ASTM D638-14 Type 1
Elongation at Break (X/Y)	25%	25%	ASTM D638-14 Type 1
Elongation at Break (Z)	15%	15%	ASTM D638-14 Type 1
Flexural Strength	42 MPa	6200 psi	ASTM D790-17
Flexural Modulus	1100 MPa	165 ksi	ASTM D790-17
Notched Izod	60 J/m	1.1 ft-lb/in	ASTM D256-10
Thermal Properties	METRIC	IMPERIAL	METHOD
Heat Deflection Temp. @ 1.8 MPa	46 °C	116 °F	ASTM D648-16
Heat Deflection Temp. @ 0.45 MPa	161 °C	321 °F	ASTM D648-16
Vicat Softening Temperature	170 °C	337 °F	ASTM D1525
Other Properties	METRIC	IMPERIAL	METHOD
Water Absorption (printed part)	0.30%	0.30%	ASTM D570

Samples printed with Nylon 12 Tough have been evaluated in accordance with ISO 10993-1:2018, and has passed the requirements for the following biocompatibility risks:

ISO Standard	Description ^{3,4}
ISO 10993-11:2017	No systemic toxicity
ISO 10993-5:2009	Not cytotoxic
ISO 10993-23:2021	Not an irritant
ISO 10993-10:2021	Not a sensitizer
ISO 10993-11:2017	Nonpyrogenic

Flammability Properties

Testing Standard	Rating
UL 94 Section 7	HB *

* Thickness of the sample tested = 3.00mm

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%	0.2	Mineral oil, heavy	1.0
Acetone	0.2	Mineral oil, light	0.8
Bleach ~5% NaOCl	0.1	Salt Water (3.5% NaCl)	0.2
Butyl Acetate	0.1	Skydrol 5	0.8
Diesel Fuel	0.6	Sodium hydroxide solution (0.025% pH = 10)	0.1
Diethyl glycol monomethyl ether	0.5	Strong Acid (HCl Conc)	5.6
Hydraulic Oil	0.9	TPM	0.8
Hydrogen peroxide (3%)	0.1	Water	0.1
Isooctane	0.1	Xylene	0.2
Isopropyl Alcohol	0.3		

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

² Parts were printed using Fuse 1+ 30W with Nylon 12 Tough Powder. Parts were conditioned at 23 °C, 50% R.H. for 48 hours.

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 Nylon 12 Tough was tested at NAMSA World Headquarters, OH, USA.

Outdoor Aging ASTM D4329

Nylon 12 Tough samples were aged by Applied Technical Services (ATS), a certified independent laboratory, using ASTM D4329-21, Cycle A. This standard outlines procedures for accelerated weathering of plastics using a Xenon arc light source, which simulates the full spectrum of sunlight (UV, visible, and infrared) and includes moisture cycles via water spray. The aged samples were then tested at Formlabs by a calibrated automatic tensile tester, as well as measured and analyzed with a spectrophotometer for color changes.

Read more about the results in the [whitepaper](#).

