

ENGINEERING MATERIAL

# Nylon 12

Nylon 12 Powder For Strong, Functional Prototypes and End-Use Parts

With high tensile strength, ductility, and environmental stability, Nylon 12 Powder is suitable for creating complex assemblies and durable parts with minimal water absorption.

Nylon 12 Powder is specifically developed for use on the Fuse 1.



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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.

## NYLON 12 MATERIAL PROPERTIES DATA

|                                  | METRIC <sup>1,2</sup> | IMPERIAL <sup>1,2</sup> | METHOD             |
|----------------------------------|-----------------------|-------------------------|--------------------|
| <b>Tensile Properties</b>        |                       |                         |                    |
| Ultimate Tensile Strength        | 50 MPa                | 7252 psi                | ASTM D638 Type 1   |
| Tensile Modulus                  | 1850 MPa              | 268 ksi                 | ASTM D638 Type 1   |
| Elongation at Break (X/Y)        | 11%                   | 11%                     | ASTM D638 Type 1   |
| Elongation at Break (Z)          | 6%                    | 6%                      | ASTM D638 Type 1   |
| <b>Flexural Properties</b>       |                       |                         |                    |
| Flexural Strength                | 66 MPa                | 9572 psi                | ASTM D790 A        |
| Flexural Modulus                 | 1600 MPa              | 232 ksi                 | ASTM D790 A        |
| <b>Impact Properties</b>         |                       |                         |                    |
| Notched Izod                     | 32 J/m                | 0.60 ft-lb/in           | ASTM D256          |
| <b>Temperature Properties</b>    |                       |                         |                    |
| Heat Deflection Temp. @ 1.8 MPa  | 87 °C                 | 189 °F                  | ASTM D648          |
| Heat Deflection Temp. @ 0.45 MPa | 171 °C                | 340 °F                  | ASTM D648          |
| Vicat Softening Temperature      | 175 °C                | 347 °F                  | ASTM D1525         |
| <b>Other Properties</b>          |                       |                         |                    |
| Moisture Content (powder)        | 0.25%                 | 0.25%                   | ISO 15512 Method D |
| Water Absorption (printed part)  | 0.66%                 | 0.66%                   | ASTM D570          |

Samples printed with Nylon 12 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> |
|---------------------------|-----------------------|
| EN ISO 10993-5:2009       | Not cytotoxic         |
| ISO 10993-10:2010/(R)2014 | Non irritant          |
| ISO 10993-10:2010/(R)2014 | Not a 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%                  | 0.10                  | Mineral oil, heavy                         | 0.66                  |
| Acetone                         | 0.14                  | Mineral oil, light                         | 0.54                  |
| Bleach ~5% NaOCl                | 0.21                  | Salt Water (3.5% NaCl)                     | 0.15                  |
| Butyl Acetate                   | 0.18                  | Skydrol 5                                  | 0.59                  |
| Diesel Fuel                     | 0.43                  | Sodium hydroxide solution (0.025% pH = 10) | 0.20                  |
| Diethyl glycol monomethyl ether | 0.49                  | Strong Acid (HCl Conc)                     | 0.76                  |
| Hydraulic Oil                   | 0.59                  | TPM  | 0.31                  |
| Hydrogen peroxide (3%)          | 0.20                  | Water                                      | 0.05                  |
| Isooctane                       | 0.01                  | Xylene                                     | 0.12                  |
| Isopropyl Alcohol               | 0.19                  |  |                       |

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

<sup>2</sup> Parts were printed using Fuse 1 with Nylon 12 Powder. Parts were conditioned at 50% relative humidity and 23 °C for 7 days before testing.

<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> Nylon 12 was tested at NAMS World Headquarters, OH, USA.