NinjaTek *Technical Specifications*

NinjaFlex® 3D Printing Filament

Flexible Polyurethane Material for FDM Printers

NinjaFlex flexible filament leads the industry with superior flexibility and longevity compared to non-polyurethane materials. Its consistency in diameter and ovality (roundness) outpaces other polyurethane materials. Made from a specially formulated thermoplastic polyurethane (TPU) material, this patented technology contains a low-tack, easy-to-feed texture. The result is uniquely flexible, strong prints ideal for direct-drive extruders.

General Properties	Test Method	Imperial	Metric
Specific Gravity	ASTM D792	1.19 g/cc	1.19 g/cc
Moisture Absorption - 24 hours	ASTM D570	0.22 %	0.22 %
Mechanical Properties			
Tensile Strength, Yield	ASTM D638	580 psi	4 Mpa
Tensile Strength, Ultimate	ASTM D638	3,700 psi	26 Mpa
Tensile Modulus	ASTM D638	1,800 psi	12 Mpa
Elongation at Yield	ASTM D638	65%	65%
Elongation at Break	ASTM D638	660%	660%
Toughness (integrated stress-strain curve; calculated stress x strain)	ASTM D638	12,000 $in{\cdot}lbF/in^3$	82.7 $m*N/m^3$ x10^6
Hardness	ASTM D2240	85 Shore A	85 Shore A
Impact Strength (notched Izod, 23C)	ASTM D256	2.0 $ft.lbf/in^2$	4.2 kJ/m^2
Abrasion Resistance (mass loss, 10,000 cycles)	ASTM D4060	0.08 g	0.08 g
Thermal Properties			
Melting Point (via Differential Scanning Calorimeter)	DSC	420° F	216° C
Glass Transition (Tg)	DSC	-31° F	-35° C
Heat Deflection Temperature (HDT) @ 10.75psi/ 0.07 MPa	ASTM D648	140° F	60° C
Heat Deflection Temperature (HDT) @ 66psi/ 0.45 MPa	ASTM D648	111° F	44° C

NinjaTek filament is capable of being printed by a variety of printers in a variety of configurations. This specification sheet gives results as they pertain to the defined test standard and specimen details. Different slicing and/or printing configurations, test conditions, ambient environments, etc. may result in different results.

Impact Strength and Heat Deflection Temperature results were both provided by an accredited university testing laboratory. Specific Gravity and Hardness are innate characteristics of the material. Moisture Absorption, values associated with the Tensile Strength tests, Melting Point and Glass Transition data were prepared by Fenner Drives, Inc.

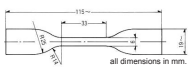
NinjaTek makes no warranties of any type, express or implied, including, but no liited to, the warranties of fitness for a particular application.

Test Specimen Details (by ASTM Test Number)
All printed specimens were created using the TAZ5 printer 0.75mm nozzle. For ASTM D638 tests, the extrusion multiplier is 1.05.

Specific Gravity (D792): Results determined by nature of material.

Moisture (D570): 30g of filament tested in moisture analyzer evaluated at 125°C until the mass change is < 0.005% over 1 minute.

Tensile (D638): Dogbone Style IV, 100% fill, diagonal line fill. Dimensions: 5mm thick. See drawing for other dimensions.



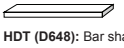
Hardness (D2240): Solid testing block.

Dimensions:
2"L x 2" H x 0.75" W

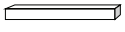
Impact (D256): Un-notched test specimen, notch added post print by testing facility.

Dimensions:
2.5 " L x 0.25" H x 0.5" W

Abrasion (D4060): Rectanglar block sized to fit tabor abrader.


Dimensions:
5" L x 0.5" H x 0.5" W

HDT (D648): Bar shape.


Dimensions:
7.5" L x 0.125" H x 0.5" W