NinjaTek *Technical Specifications*

Armadillo™ 3D Printing Filament

Semi-Rigid Polyurethane Material for FDM Printers

Armadillo™ 3D printing filament is a perfect alternative to some of the most common rigid materials on the market. Made from a specially formulated thermoplastic polyurethane (TPU), its advantages against PLA and ABS lie in its printability and toughness.

General Properties	Test Method	Imperial	Metric
Specific Gravity	ASTM D792	1.18 g/cc	1.18 g/cc
Moisture Absorption - 24 hours	ASTM D570		
Mechanical Properties			
Tensile Strength, Yield	ASTM D638	3,900 psi	27 Mpa
Tensile Strength, Ultimate	ASTM D638	6,900 psi	48 Mpa
Tensile Modulus	ASTM D638	57,500 psi	396 Mpa
Elongation at Yield	ASTM D638	18%	18%
Elongation at Break	ASTM D638	295%	295%
Toughness (integrated stress-strain curve; calculated stress x strain)	ASTM D638	14,000 in·lbF/in^3	96.5 m*N/m^3 x10^6
Hardness	ASTM D2240	75 Shore D	75 Shore D
Impact Strength (notched Izod, 23C)	ASTM D256	1.41 ft.lbf/in^2	3.0 kJ/m^2
Abrasion Resistance (mass loss, 10,000 cycles)	ASTM D4060	0.03 g	0.03 g
Thermal Properties			
Melting Point (via Differential Scanning Calorimeter)	DSC	413° F	212° C
Glass Transition (Tg)	DSC	14° F	-10° C
Heat Deflection Temperature (HDT) @ 10.75psi/ 0.07 MPa	ASTM D648	115° F	46° C
Heat Deflection Temperature (HDT) @ 66psi/ 0.45 MPa	ASTM D648	106° F	41° 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.

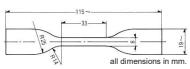
NinjaTek makes no warranties of any type, express or implied, including, but no liited to, the warranties of fitness for a particular application.

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.



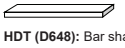
Hardness (D2240): Solid testing block.

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

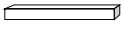
Impact (D256): Un-notched test specimen, notch added post print by testing facility.

Dimensions:
2.5 " L x 0.125" 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