

# POLYMAKER POLYIMIDE NYLON PA6-CF BLACK

Information provided by Polymaker Distributor Australia 14/05/21

## PRINTING SETTINGS

<b>Nozzle Temperature</b>	280°C - 300°C *
<b>Build Surface Material</b>	Almost any surface (I.e Glass, Buildtak etc.)
<b>Build surface treatment</b>	PVA glue or Magigoo PA applied to the build surface.
<b>Build plate temperature</b>	25°C – 50°C (Do NOT exceed 50 °C)
<b>Cooling fan</b>	Turned off
<b>Printing speed</b>	60mm/s
<b>Recommended support material (optional)</b>	Ultimaker PVA or PolyDissolve™ S1

\* We highly recommend to use a wear resistant nozzle. Brass nozzles give a better thermal conductivity than hardened nozzles such as stainless steel so depending on your 3D printer, printing with extrusion temperatures closer to 300°C may be required when using specialty nozzles to ensure the correct extrusion temperature is achieved.

**Note:** Based on 0.4 mm nozzle and Simplify 3D v.3.1. Printing conditions may vary with different printers and nozzle diameters

## ANNEALING SETTINGS

PolyMide™ PA6-CF printed parts can be annealed in an oven after printing to maximize mechanical performance and heat resistance.

<b>Time</b>	2 Hours
<b>Temperature (°C)</b>	90°C

In some rare cases with fine or thin geometries, different annealing instructions or design considerations may be required for the best results.

## STORAGE & DRYING:

Before packaging, PolyMide™ PA6-CF is dried to ensure the best printing quality and filaments are vacuum sealed to protect the filament from moisture. When not in use PolyMide™ PA6-CF should be stored away from sunlight in the packaged resealable bag.

Nylon 6 is hygroscopic so it is highly recommended to store PolyMide™ PA6-CF in the [PolyBox™](#) or a dry cabinet during printing to prevent moisture absorption which will lower the quality and the mechanical properties of the print. The PolyBox™ keeps the filament at dry conditions (relative humidity of 15% or less).

We recommend that the material be used with the [PolyBox™](#) to keep the filament at dry conditions (relative humidity of 15% or less) to maintain the best printing results. If the filament does absorb moisture, spools of PolyMide™ PA6-CF can be dried in a preheated convection oven at 80°C for up to 12 hours. Results may vary depending on the accuracy of your oven so please be conservative. For more information about filament drying please read our [user guide](#).

## SPECIFICATION

<b>Net Weight</b>	500g
<b>Diameter</b>	1.75 mm
<b>Density</b>	1.17 g/cm <sup>3</sup>
<b>Technologies</b>	Fiber Adhesion™ and Warp-Free™ Technology

## TECHNICAL DATA

*All testing specimens were printed under the following conditions: nozzle temperature = 300°C, cooling fan = OFF, build plate temperature = 45°C, infill = 100%, environmental temperature = 25 - 50°C  
All specimens were annealed prior to testing.*

<b>Thermal Property</b>	<b>Value</b>	<b>Testing Method</b>
Heat deflection temperature (0.45 MPa)	215°C	ISO 75 0.45MPa
Heat deflection temperature (1.8 MPa)	173°C	ISO 75 1.8MPa
Melting Temperature	218.5°C	DSC, 10° C/min

<b>Dry State</b>		
<i>All specimens were annealed at 80°C for 24h and dried for 48h prior to testing.</i>		
<b>Mechanical Property</b>	<b>Value</b>	<b>Testing Method</b>
Young's modulus (X-Y)	7,453 MPa	ISO 527, GB/T 1040
Young's modulus (Z)	4,354 MPa	
Tensile strength (X-Y)	105 MPa	ISO 527, GB/T 1040
Tensile strength (Z)	67.7 MPa	
Bending strength (X-Y)	169.0 MPa	ISO 178, GB/T 9341
Bending strength (Z)	N/A	
Charpy impact strength (X-Y)	13.34 kJ/m <sup>2</sup>	ISO 179, GB/T 9343
Charpy impact strength (Z)	N/A	

<b>Moisture Conditioned State</b>		
<i>All specimens were annealed at 80 ° C for 24h, and conditioned at 70% RH/23 ° C and ambient temperature for 15 days prior to testing.</i>		
<b>Mechanical Property</b>	<b>Value</b>	<b>Testing Method</b>
Young's modulus (X-Y)	5,666 MPa	ISO 527, GB/T 1040
Young's modulus (Z)	4,713 MPa	
Tensile strength (X-Y)	81.7 MPa	ISO 527, GB/T 1040
Tensile strength (Z)	64.4 MPa	
Bending strength (X-Y)	152.2 MPa	ISO 178, GB/T 9341
Bending strength (Z)	N/A	
Charpy impact strength (X-Y)	32.8 kJ/m <sup>2</sup>	ISO 179, GB/T 9343
Charpy impact strength (Z)	N/A	

We have full safety data sheets and technical data sheets for PolyMide™ PA6-CF and all other Polymaker products. [Contact us to enquire!](#)

The typical values presented in Polymakers data sheet are intended for reference and comparison purposes only. Due to the nature of 3D printing they should not be used for design specifications or quality control purposes.

## COMPATIBILITY

PolyMide™ PA6-CF has been engineered so users can print strong carbon fiber filled parts with excellent layer-adhesion. As the carbon fiber in this material is highly abrasive we recommend customers first check that their 3D printer is equipped to print abrasive materials before purchasing this product.

Aside from wear resistance, there are a few important considerations for this material that we recommend.

Reinforced filaments tend to be much stiffer than other standard filaments and this can cause problems when passing the filament through a printer's feeding system. For a steady and uninterrupted flow of filament, it is recommended to take extra care and make sure your filament guide system is smooth and with minimal bends. Brass nozzles give a better thermal conductivity than hardened nozzles such as stainless steel. Depending on your 3D printer, printing with extrusion temperatures closer to 300°C may be required when using specialty nozzles to ensure the correct extrusion temperature is achieved.

Of course with thousands of unique 3d printer models on the market, we can't guarantee each filament type will work with every 3D printer.

## FAQ

**Q:** Can I print this material without wear resistant hardware (nozzle etc.)?

**A:** PolyMide™ PA6-CF contains 20% chopped carbon fibers by weight which makes it very abrasive. It is important to have an abrasion resistant nozzle and hardware when printing this material. PolyMide™ PA6-CF can easily damage a brass nozzle after a few hundred grams of printing. Hardened nozzles are more expensive than regular brass nozzle so it is important to consider the amount of materials planned to be used. For some users it may be more cost effective to destroy one nozzle for some prints, but please note users are responsible for all printer 'wear and tear'.

**Q:** How well does Polymakers Warp-Free™ technology perform?

**A:** With Polymakers Warp-Free technology, more users can effectively print Carbon-fiber nylon with better dimensional stability than comparative nylon products. This technology works best when printing with low bed/chamber temperatures. Because the warping behavior of Nylon materials is partially related to its crystallization rate while printing. If a user does print with a high temperature heated bed or chamber, the heat will increase the crystallization rate and cause a part to warp.

**Q:** Is annealing PolyMide PA6-CF required?

**A:** After printing, annealing PolyMide™ PA6-CF prints will ensure the highest degree of crystallinity. This is a recommended step as it allows end users to get the best properties and performance from their parts. PolyMide™ PA6-CF can be annealed in a convection oven at 90°C for 2 hours. Of course annealing may not be required for applications that don't require the best thermal or mechanical properties. In some rare cases with fine or thin geometries, different annealing instructions or design considerations may be required for the best results.

**Q:** Will this filament absorb moisture?

**A:** Yes, Polyamides are hygroscopic, meaning that they absorb moisture from the air. We recommend keeping your spool of PolyMide™ PA6-CF dry as moisture can significantly reduce mechanical properties and cause print defects such as oozing and poor surface quality. To manage moisture absorption in your filaments, it is recommended to use the PolyBox™ which provides a stable, low level humidity storage solution for filaments during and in-between printing. If PolyMide™ PA6-CF appears to have absorbed too much moisture, they can be dried in a preheated convection oven for 12 hours at 80°C.

**Q:** What support materials can I use with this product?

**A:** Polymaker's PolyDissolve™ S1 filament is the recommended support filament for PolyMide™ PA6-CF. If support material is required for a print, it is recommended to monitor print settings and quality for oozing and stringing; as this can dramatically affect the mechanical properties of the print. Self-support can also be used however, it is important to remove the support structures straight after printing, as prolonged exposure to atmospheric humidity can cause the support to strongly adhere to the printed part.

Don't know where to start? Or which filament will suit your application? We have a broad range of support options including telephone support.