



PolyMide™ PA612-CF



Industrial

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Printing with PolyMide™ PA612-CF

PolyMide™ PA612-CF

PolyMide™ PA612-CF is a carbon fiber reinforced long chain copolyimide filament. Thanks to its chemical structure, this product has lower moisture sensitivity compared to PA6/66 and PA6-based materials, and better mechanical properties than PA12-based materials. In addition, the carbon fiber reinforcement and Warp-Free™ technology enhance the size stability of the prints produced with this material.



Printing settings

Nozzle Temperature:	250-300 °C
Bed Temperature:	25-50 °C (Do NOT exceed 50 °C)
Printing Speed:	30-60 mm/s
Cooling Fan:	OFF

Note: Settings are based on 0.4 mm nozzle, and may vary with different printers and nozzle diameters.



Bed surface

PolyMide™ PA612-CF can be printed on almost any surface with a thin coat of PVP glue or Magigoo PA. We recommend a flex plate to facilitate the removal of the model from the plate.

Wear resistant nozzle

PolyMide™ PA612-CF contains 15% chopped carbon fibers by weight which makes it very abrasive. It is important to have an abrasion resistant nozzle.

Nozzles can come in many different materials, from soft to hard:

Brass

Nickel plated copper

Steel

Stainless steel

Tool steel

Tungsten-carbide

Ceramic/Metal hybrid

PolyMide™ PA612-CF can easily damage a brass nozzle after a few hundred grams of printing. Hardened nozzles, whilst abrasion resistant, are more expensive. Therefore, it is important to consider the cost of investing in a hardened nozzle, the potential frequency of use and scale of the print project.

If printing PolyMide™ PA612-CF at low temperature (250-260 °C) on a general desktop 3d printer, it is highly recommended to use a hardened nickel-coated brass nozzle with better thermal conductivity.

Note: Brass nozzle will give a better thermal conductivity than hardened nozzle such as stainless steel.

High temperature hot end

We recommend a full metal hot end that can maintain a stable temperature of at least $> 250\text{ }^{\circ}\text{C}$.

Annealing PolyMide™ PA612-CF parts

We recommend annealing all models printed in PolyMide™ PA612-CF. This allows users to take advantage of the full mechanical and thermal properties of this material.

The annealing process consists of putting the model in an oven at $80\text{ }^{\circ}\text{C}$ for 6 hours.

	PolyMide™ PA612-CF	
	As Printed	80 °C Annealed
Tensile Strength (MPa)	60.6 ± 0.27	86.1 ± 1.0
Young's Modulus (MPa)	3364.6 ± 174.0	4735.7 ± 87.9
Bending Strength (MPa)	88.3 ± 1.8	125.1 ± 2.6
HDT @ 1.8 MPa	$55\text{ }^{\circ}\text{C}$	$115\text{ }^{\circ}\text{C}$

Support material

When using PolyMide™ PA612-CF as a self-support, it is important to remove the support structure right after printing.

Leaving the part exposed to atmospheric moisture may result in strong bonding between the support and printed part, making support removal difficult.

The compatibility of PolyMide PA612-CF with PolySupport For PA12 is very excellent, it is suggested using PolySupport For PA12 to print support structure when using PolyMide PA612-CF.

Feeding system

PolyMide™ PA612-CF is a very stiff filament so it is required to have a good set up to ensure a good feeding. For example we recommend avoiding excessive bending in the filament guide system.

Dry box system

Although it is less sensitive to moisture, we recommend storing PolyMide™ PA612-CF in a PolyBox™ to prevent moisture absorption. If the filament has absorbed moisture it can be dried at 80 °C for 12 hours in a convection oven.

Note:

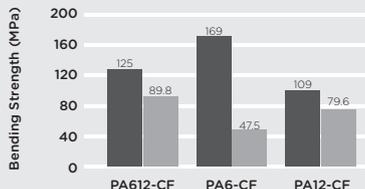
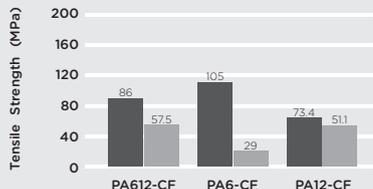
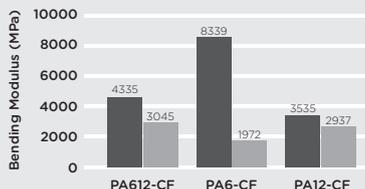
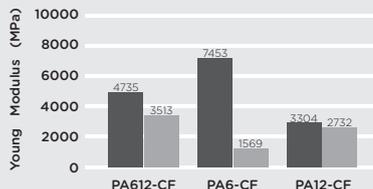
Polymaker provides the filament with the right moisture amount, having a filament with an extremely low moisture content can affect its processability.



PolyMide™ Family

Mechanical properties comparison among PolyMide™ PA612-CF, PolyMide™ PA6-CF and PolyMide™ PA12-CF under dry and wet status.

- Dry condition
- Wet condition



Note:

Dry condition: All specimens were annealed at 80 °C for 24h and dried for 48h prior to testing.

Wet condition: All specimens were annealed at 80 °C for 24h, and immersed in ambient temperature water for 3 days prior to testing.

Excellent surface quality In fused filament fabrication (FFF), material itself contributes significantly to the surface quality. The surface finish of printed PolyMide™ PA612-CF objects is excellent due to better fluidity of PolyMide™ PA612-CF and less fiber content.

No warping Nylon warps due to its crystallization behavior and warping can significantly influence dimensional accuracy of printed parts. Our Warp-Free™ technology is achieved by the fine control of micro-structure and crystallization behavior of Nylon, which can help printed parts prevent warping and realize excellent dimensional stability.

Fiber Adhesion™ Technology

Fiber Adhesion™ technology dramatically improves the Z-axis strength, via engineering the surface chemistry of the fibers to achieve a strong fiber/matrix bonding.

In contrast to conventional fiber-reinforced filaments, which exhibit considerable reduction in Z-axis strength, PolyMide™ PA612-CF provides a higher interlayer adhesion compared to unreinforced PA612.



Layer adhesion

Tensile strength
(Z axis)
(ISO 527, GB/T 1040)

Unreinforced PA12

23.4Mpa
PolyMide™ PA612-CF
29.2Mpa

+24.8%

Competitor 1

35% CF by weight

Neat Nylon

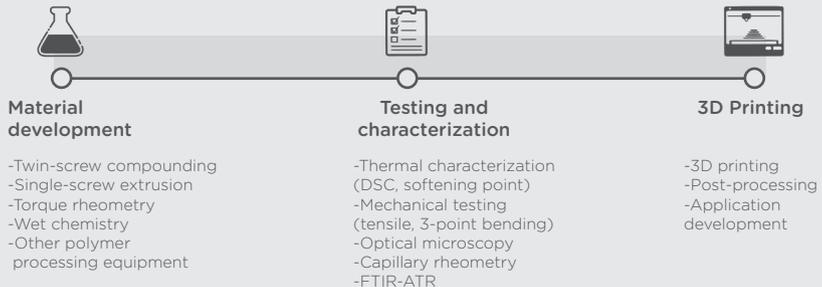
48 Mpa

Nylon-CF

28.9 Mpa **-40%**

Material Development

If your application requires a specific material that is not yet available in the market, consider our custom development service. With our talented material scientists and application engineers, we are ready to develop the necessary materials to enable your application.



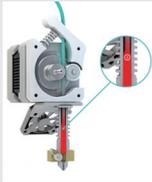
Our state-of-the art R&D facilities allow us to engineer materials at different levels and fully optimize them for 3D printing. Our goal is to deliver materials with the right combination of properties/functions, processability and form to suit your needs!



Technologies

JAM-FREE™

Regular PLA



With Jam-Free™



ASH-FREE™

Without Ash-Free™
Ash content: 0.5%

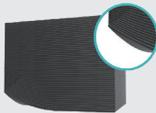


With Ash-Free™
Ash content: 0.003%



WARP-FREE™

Regular Nylon



With Warp-Free™



STABILIZED FOAMING™

Wood



Stabilized Foaming™



LAYER-FREE™

Rough surface



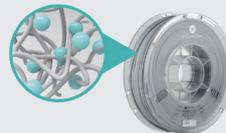
With Layer-Free™



FIBER ADHESION™



NANO-REINFORCEMENT



About Polymaker

Our Values



Customer
Oriented



Responsible



Entrepreneurial



Embracing
Innovation

Mission

Polymaker is committed to lowering the barriers to innovation and manufacturing, by continuously developing advanced 3D printing material technologies for industries and consumers.

Contact us

For any inquiries please contact:

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For technical support please contact:

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The information provided in this document is intended to serve as basic guidelines on how particular product can be used. Users can adjust the printing conditions based on their needs and actual situations. It is normal for the product to be used outside of the recommended ranges of conditions. Each user is responsible for determining the safety, lawfulness, technical suitability, and disposal/recycling practices of Polymaker materials for the intended application. Polymaker makes no warranty of any kind, unless announced separately, to the fitness for any particular use or application. Polymaker shall not be made liable for any damage, injury or loss induced from the use of Polymaker materials in any particular application



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