

# Printing Recommendations for PA-CF Jet and PA-GF Jet Filaments (Filled PA12)

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PA-CF Jet and PA-GF Jet are filled PA12 polyamides. PA-CF Jet contains 17% carbon fiber, while PA-GF Jet contains 30% glass fiber. Compared to pure PA Jet, they are significantly easier to print: the reinforcement reduces shrinkage and warping and improves dimensional stability. These are engineering materials intended for functional parts such as gears, sliding bushings, holders, fixtures, and components used in demanding environments where stiffness, dimensional stability, and temperature resistance are critical. Both materials contain abrasive fibers, which makes a hardened nozzle mandatory.

## WHAT TO EXPECT – AND WHAT NOT TO EXPECT

This is not pure PA Jet – and that is a good thing. The PA12 reinforcement creates a much more stable material: it warps less, maintains dimensions better, and tolerates minor printing errors. Our profile is a tuned starting point for the specific hardware combination listed below and provides reliable results for functional parts. However, it is not a universal profile for every geometry; always consider whether the model is suitable for filled PA12 and adjust settings when necessary.

Expect: stiff and dimensionally stable functional parts, excellent interlayer strength, a matte technical finish, and less warping than pure PA12.

Do not expect: warping to disappear completely. Filled PA12 warps less than pure PA12, but it still warps—especially at corners and on large flat parts. Strong bed adhesion and a brim are mandatory, not optional. Also do not expect PLA-like visual perfection or successful printing with a brass nozzle.

## PA-CF JET VS. PA-GF JET

Common characteristics:

- PA12 base material with abrasive fibers – hardened nozzle required.
- Enclosed and preheated chamber, bed temperature 100–110 °C, Magigoo PA adhesive.
- Both materials can still warp at corners and require excellent adhesion and a brim.
- Better moisture resistance than pure PA12 because part of the hygroscopic polymer is replaced by fibers.

PA-CF Jet (17% carbon fiber)

- Lower printing temperature than GF.
- Matte graphite-black appearance.
- High stiffness and dimensional stability with lower weight.
- Impact strength: 8.3 kJ/m<sup>2</sup>; Flexural strength: 1546 MPa.

PA-GF Jet (30% glass fiber)

- Higher printing temperature.
- Lighter-colored, slightly rougher technical surface.
- Nearly double the filler content and therefore even more abrasive.
- Extremely stiff and strong material.
- Impact strength: 13.4 kJ/m<sup>2</sup>; Flexural strength: 1700 MPa.

## ⚠ Golden Rules for Printing PA-CF / PA-GF Jet ⚠

### 1. Hardened Nozzle Required

Carbon and glass fibers are hard and abrasive. Use a hardened steel nozzle with a minimum diameter of 0.4 mm.

### 2. Drying

Dry at 85 °C for 8–12 hours before printing and keep the filament dry afterwards.

### 3. Preheated Chamber

For H2S, stabilize the chamber at approximately 60 °C. For Prusa Core One, print with closed doors and allow adequate heat soak.

### 4. Adhesion

Use Magigoo PA (or Magigoo HT for higher bed temperatures). Apply to a cool or slightly warm bed and allow 2–3 minutes to dry.

### 5. Cooling

AUX fan 0%. Part cooling of 10–30%, up to 40% on overhangs, improves detail without significantly reducing strength.

### 6. Slow Cooling After Printing

Keep the printer closed until the bed temperature drops below 40 °C.

## Validated Printer Platforms

System 1: Bambu Lab H2S (0.4 mm hardened nozzle)

- Best choice for maximum mechanical strength, production printing, and large functional parts.

- Active heated chamber provides the most stable environment for filled PA.

System 2: Prusa Core One (0.4 mm hardened nozzle)

- Ideal for small and medium-sized technical parts requiring precision and detail.
- Passive chamber requires longer preheating but offers repeatable results.

## Key Printing Parameters

| Parameter           | PA-CF Jet                      | PA-GF Jet                      |
|---------------------|--------------------------------|--------------------------------|
| Nozzle Temperature  | 250–270 °C (rec. 265)          | 270–290 °C (rec. 280)          |
| Bed Temperature     | 100–110 °C                     | 100–110 °C                     |
| Chamber             | ~60 °C active / ~55 °C passive | ~60 °C active / ~55 °C passive |
| Filament Drying     | 85 °C / 8–12 h                 | 85 °C / 8–12 h                 |
| Adhesive            | Magigoo PA / HT                | Magigoo PA / HT                |
| Hardened Nozzle     | Required                       | Required                       |
| Part Cooling        | 10–30%, up to 40% on overhangs | 10–30%, up to 40% on overhangs |
| AUX Fan             | 0%                             | 0%                             |
| Max Volumetric Flow | 8 mm <sup>3</sup> /s           | 8 mm <sup>3</sup> /s           |
| Brim                | 5–10 mm                        | 5–10 mm                        |
| Cooling After Print | Below 40 °C in closed chamber  | Below 40 °C in closed chamber  |

## Fine Tuning

- Large flat parts (>150 × 150 mm): increase brim size, use sufficient adhesive, and ensure thorough chamber preheating.
- Small detailed parts: reduce outer wall speed for improved surface quality.
- Parts with large overhangs: slightly increase overhang cooling if necessary.
- High-precision parts: print a 20 × 20 × 20 mm calibration cube and compensate for shrinkage.

## Summary

PA-CF Jet and PA-GF Jet are premium engineering materials for functional parts. Follow the drying, adhesion, enclosure heating, cooling, and hardened-nozzle recommendations to obtain stiff, dimensionally stable, and temperature-resistant parts suitable for demanding applications.