

PA12CF35

Carbon Fiber PA12 Copolymer

Print Settings	
Extruder Temperature	235°C
Bed Temperature	N/A
Bed Preparation	Clean with isopropyl alcohol before and after every print job.
Cooling Fan	Default: ON
Heated Chamber	Yes
Closed Chamber	Yes
Chamber Temperature	40°C
Notes	

Material Management	
Drying	Temperature • 70°C - 80°C Dry Time • Heat only → 12hours • Heat + Vacuum → 3 hours
Recommended Support Material	• SSU00 • SSU09
Storage	• Highly hygroscopic material; store in moisture free environment.
Compatible Materials	

Slicer Settings	KISSlicer (0.4mm)
Material Profile Name	PA12CF35 (0.4)
Layer Height	0.18 – 0.24 mm, 0.2 mm * First layer should be 0.2mm
Loops	5.5
Skin	1
Infill	20 %

Machine Setup & Procedure

A wide variety of filled materials are becoming more and more widely used for FFF printing. Where high strength and high heat deflection temperatures are needed, they are among the best choices available for additive manufacturing today. They also have a significant cost advantage over the emerging “super polymers” like PEEK, PEKK and Ultem, as well as being more printable and having a wider choice of support materials and strategies than the super polymers.

The primary downside to filled materials is their abrasiveness, which causes significantly increased wear for nozzles and feed mechanisms, and the difficulty of handling and feeding due to their stiffness. The basic requirements to print most filled materials are:

1. Hardened nozzles (all 3 nozzles need hardened nozzles, not just the nozzle used for printing).
2. Material must be dry. We always dry any nylon-based material over night before printing.



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Drying Materials

Nylons are among the more hygroscopic materials we print and must be properly dried and kept dry during the printing process for them to develop their full mechanical properties and print with high quality surfaces and accurate dimensions. See drying information for temperatures and time required for drying. Nylon Carbons should be dried prior to printing, then kept in our MMS or a dry box to reduce its reabsorption of moisture. If print surface quality begins to degrade or stringing and "bumps" appear at seams or on the surface, the material needs to be thoroughly dried again.

Support Materials

Filled materials are generally paired with at least one support material. PA12CF35 uses SSU00 for breakaway support and SSU09 for soluble support. See SSU09 printing guide for complete information on this material.

Build Surfaces

SSU00 and SSU09 both print and release well on our Diamond (red) build plates. SSU09 may need a "bump" to loosen it from the build plate, unlike SSU00, ASA and ABS which fully release when cool.

Nozzles

Hardened nozzles are required. We use and recommend tungsten nozzles made for 3ntr printers, which have the proper internal geometry for optimum material flow and surface finish.

Filament Drive Components

Abrasive materials will prematurely wear filament drive gears as well. Please monitor your system for any potential filament feed slipping, which could indicate that cleaning is needed (monthly to quarterly cleaning as a preventative measurement is recommended under any circumstances) or a filament drive gear is worn enough to warrant replacement (figure 2). Consider drive gears a consumable with filled materials. How often they will need to be replaced is highly geometry dependent. We keep a spare motor with new feed gear handy to switch out whenever needed, replacing the drive gear on the stepper motor at our convenience when it doesn't hold up printing.

General Handling

Most filled materials (in our experience) are stiff and brittle off the spool and can be challenging to feed. PA12CF35 is less so. As with all nylon materials, pre-drying will ensure the best quality prints. Loading the material while it is still warm from the dryer will also make it easier to handle and feed.

Characteristics

As with most filled materials, nylon carbons have a bit of a sandpaper, slightly abrasive finish, but the surface finish and appearance are nice, and the parts are very strong.

Slicing Tips

Filled materials in general need Z layer settings to be on the lower side to achieve good Z bonding, overhang performance and good surface finish. Typically, we don't exceed 50-60% of the nozzle diameter for a Z layer setting. A good Adaptive setting (on the Style menu) with a 0.4mm nozzle, for example, would be 0.18 - 0.24mm with 0.2mm first layer. Fixed Z height of 0.2mm also works well.

Post Processing

PA12CF35 does not benefit much from annealing and we don't recommend it.

Support Strategy & Removal

SSU09 support material works well both under and on-top-of build material, so pretty much any geometry can be printed. Removal of SSU09 requires the use of its "soap", Wave powder (tank temperature for PACF should be ~60°-80°C) with ultrasonic and/or flow agitation speeding the process. Manually removing as much material prior to putting in the tank, and occasional manual removal of softened material will speed the process on complex geometries where support material is not well exposed.

PA12CF35 works well with SSU00 for breakaway support, similar to ASA/ABS and SSU00. SSU00 does not stick as well "on top" of the object material, which can cause difficulties with some geometries.

Cleaning Nylon Carbon from the Nozzles

Filled materials are more difficult than most other materials to completely clean from a nozzle, generally meaning more passes with the nozzle cleaning operation than you may be accustomed to with other materials. We find it typically can take between 4 and 6 cleaning cycles before the nozzle is completely clean and ready for new materials.