



Available colors



Technical Data Sheet

PA12 + CF15

Product overview

Professional Lab PA12+CF15 is a high-performance engineering filament based on Nylon 12 reinforced with 15% carbon fiber. The material is designed to deliver an optimal balance of low weight, high stiffness, and exceptional mechanical strength, making it suitable for precision manufacturing and demanding industrial applications.

Carbon fiber reinforcement significantly enhances rigidity and structural integrity while maintaining dimensional stability and low moisture sensitivity. Printed parts exhibit reliable performance under mechanical stress and retain accuracy even in environments with variable humidity and temperature.

Product features

Enhanced Mechanical Strength

The addition of 15% carbon fiber substantially increases tensile strength, stiffness, and impact resistance. The material offers a lightweight alternative to metal components, with strength exceeding that of unfilled PA12 by over 30%.

Low Moisture Absorption and Dimensional Stability

PA12 naturally absorbs less moisture than other nylon grades. Combined with carbon fiber reinforcement, this results in excellent dimensional accuracy, minimal warping, and consistent geometry in printed parts.

Heat and Wear Resistance

Professional Lab PA12+CF15 withstands short-term operating temperatures up to 160–170°C. Its inherent self-lubricating behavior and abrasion resistance make it suitable for components exposed to friction and continuous motion.

Industrial-Grade Processability

The filament features low shrinkage and stable melt behavior, enabling reliable printing with appropriate hardware. It is compatible with advanced manufacturing workflows and supports both prototyping and end-use production.

Printing Recommendations

- Nozzle temperature: 255–270°C
- Build surface material: PA/Nylon-compatible surface, garolite, PEI
- Build surface treatment: glue, PA adhesive
- Build plate temperature: 80–100°C
- Cooling fan: off
- Printing speed: 30–70 mm/s
- Raft separation distance: 0.2 mm
- Retraction distance: 5–7 mm
- Retraction speed: 20–35 mm/s

Based on a 0.4 mm nozzle. Printing conditions may vary with different nozzle diameters.

Drying recommendations

Professional Lab PA12+CF15 is hygroscopic and must be dried prior to printing. Dry the filament at 70–90°C for 4–6 hours to prevent surface defects, bubbling, and weakened layer bonding. After drying, store the filament in a sealed container with desiccant to minimize moisture reabsorption.

Precautions

Printer Compatibility: An all-metal hotend capable of handling temperatures up to 270°C is required. Because carbon fiber is abrasive, a hardened steel or ruby nozzle is mandatory to minimize wear.

Shrinkage & Warping Control: Although PA12+CF15 offers lower shrinkage than PA6 or PA66, printing inside an enclosed chamber is recommended for larger components. Avoid sudden cooling or drafts to maintain stable layer adhesion and reduce edge lifting.

Cooling Settings: Print with cooling fan turned off to achieve maximal layer bonding strength and consistent surface integrity.

Filament Storage: Store Professional Lab PA12+CF15 in a dry, sealed container with desiccant. Nylon materials absorb moisture quickly; if extrusion becomes inconsistent, dry the filament again before printing.

Printing & Handling Guidelines

Due to the abrasive nature of carbon fiber reinforcement, the use of hardened steel or ruby nozzles is mandatory. An all-metal hotend capable of high extrusion temperatures is required for stable processing.

Printing in an enclosed build chamber is recommended for larger or high-precision parts to ensure temperature stability and optimal layer adhesion. Controlled cooling improves surface integrity and mechanical performance.

Important Notes

- Abrasive composite material – hardened nozzle required
- Enclosure recommended for large or structural prints
- Stable thermal conditions improve dimensional accuracy
- Print parameters may vary depending on printer and environment

Property	Test Standard	Unit	Typical Value
Density (Specific Gravity)	ISO 1183	g/cm ³	1.07
Tensile Strength @ Break	ISO 527	MPa	120
Tensile Modulus	ISO 527	MPa	7300
Elongation @ Break	ISO 527	%	5
Flexural Modulus	ISO 178	MPa	7000
Notched Izod Impact Strength (23°C)	ISO 180	kJ/m ²	15
Heat Distortion Temperature @ 0.45 MPa	ISO 75	°C	170
Heat Distortion Temperature @ 1.8 MPa	ISO 75	°C	150
Vicat Softening Temperature	ISO 306	°C	170
Glass Transition Temperature (T _g)	DSC	°C	–
Melting Temperature (T _m)	DSC	°C	178
Continuous Use Temperature	UL 746	°C	100

Disclaimer of Liability

The data provided in this document is intended for reference and comparison only. Actual performance may vary depending on printer configuration, environmental conditions, part geometry, and nozzle wear. Carbon-fiber-reinforced materials are abrasive and may accelerate hardware degradation; users are responsible for ensuring proper maintenance and compatibility. Professional Lab assumes no liability for equipment damage, print failures, or performance deviations resulting from improper use. Always store and handle materials responsibly and follow all applicable local regulations.