TECHNICAL DATA SHEET



PA12+CF15

Smart Print PA12+CF15 is a high-end engineering filament developed for advanced functional and structural 3D printing. Based on Nylon 12 reinforced with 15% carbon fiber, the material delivers exceptional stiffness, mechanical strength, and dimensional precision for demanding professional applications.
This composite is engineered for users who require maximum performance, repeatability, and reliability. By combining the low moisture sensitivity of PA12 with carbon fiber reinforcement, Smart Print PA12+CF15 enables the production of lightweight yet extremely rigid components capable of operating under mechanical and thermal stress.

Product features

Advanced Mechanical Performance

The 15% carbon fiber reinforcement significantly increases stiffness, strength, and impact resistance. Smart Print PA12+CF15 exceeds the performance of standard PA12 by over 30%, enabling the production of high-load components and lightweight alternatives to metal parts.

Exceptional Dimensional Precision

Thanks to low water absorption and reinforced structure, the material maintains outstanding dimensional accuracy. Printed parts show minimal deformation and excellent repeatability, even in precision assemblies and tight-tolerance applications.

Thermal and Wear Resistance

Smart Print PA12+CF15 withstands short-term operating temperatures up to 160–170°C. Its inherent self-lubricating properties and abrasion resistance make it suitable for moving parts, mechanical interfaces, and components exposed to continuous friction.

Engineered for Demanding Applications

With low shrinkage and stable melt behavior, the filament supports complex geometries and high-performance designs. It is intended for professional environments where material consistency and predictable results are critical.

Printing guidelines

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

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

Drying guidelines

Smart Print PA12+CF15 is hygroscopic and must be dried before use. Dry the filament at 70–90°C for 4–6 hours to ensure stable extrusion, strong layer adhesion, and high surface quality. Store the material in a sealed container with desiccant to prevent moisture absorption.

Available colors



Precautions

Printer Compatibility

PA12+CF15 requires an all-metal hotend capable of sustaining temperatures up to 270°C.
Because carbon fiber is abrasive, a hardened steel or ruby nozzle is mandatory to avoid rapid nozzle wear.

Shrinkage & Warping Control

Although PA12+CF15 has lower shrinkage than PA6 or PA66, printing in an enclosed chamber is recommended for larger parts to maintain thermal stability. Avoid drafts or sudden cooling to prevent edge lift.

Cooling Settings

Print with cooling fan turned off to maximize layer bonding, strength, and surface integrity.

Filament Storage

Nylon absorbs moisture rapidly. Store PA12+CF15 in a dry box or airtight container with desiccant. If extrusion becomes inconsistent, dry the filament again before printing.

Printing & Handling Guidelines

Smart Print PA12+CF15 requires professional-grade hardware. Due to the abrasive nature of carbon fiber, a hardened steel or ruby nozzle is mandatory. An all-metal hotend capable of sustained high temperatures is recommended.
For optimal results, printing in an enclosed chamber is advised to maintain thermal stability and maximize layer bonding strength, particularly in larger or structurally demanding parts.

Important Notes

- Premium carbon-fiber composite for advanced users
- Hardened nozzle required due to abrasive fibers
- Enclosure recommended for optimal mechanical performance
- Print parameters may vary depending on hardware and environment

Property	Test Standard	Unit	Typical Value
Density (Specific Gravity)	ISO 1183	g/cm³	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/m²	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 (Tg)	DSC	°C	–
Melting Temperature (Tm)	DSC	°C	178
Continuous Use Temperature	UL 746	°C	100

Disclaimer

The performance data provided in this document is based on internal testing and is intended for general reference. Actual results may vary due to printer setup, nozzle condition, environmental factors, and part design. Carbon-fiber-reinforced materials are abrasive and may cause accelerated wear to standard components; users are responsible for ensuring proper hardware and maintenance. Smart Print assumes no liability for equipment damage, improper use, or performance outside recommended operating conditions. Always store, handle, and dispose of materials in accordance with local regulations.