

# HPPA-CF-FDM

## FusForce™ PAHT-CF

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High temperature Polyamide based with 15% chopped carbon fiber reinforced FDM material.

## Product Advantages

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### Smart Fiber Reinforced Technology

FusRock® controlling the dispersion and distribution of chopped carbon fibers within the material matrix during the extrusion process, the fibers form a mesh skeleton structure within the material and bear most of the load transferred by the material matrix. Smart Fiber Reinforced Technology greatly improves the mechanical properties and heat resistance of the material, and releases the internal stress during the printing process through the fiber mesh structure, resulting in good dimensional stability of the printed part and no warpage.

### Low Moisture Sensitivity

FusFocre™ PAHT-CF based on modified high temperature nylon, whose saturated moisture absorption rate is only one tenth of ordinary PA6, completely solving the defects of the mechanical properties and dimensional stability of nylon materials that change greatly after absorbed moisture.

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### Super Abrasive Resistance

FusForce™ PAHT-CF has a low coefficient of friction, self-lubricating properties and excellent wear resistance, which can easily meet all kinds of high-strength gears or industrial applications with high wear requirements.

### Available

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Color: Black

Diameter: 1.75mm/ 2.85mm

Net Weight: 500g, 1kg, 2.5kg, 3kg

### Product Description

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FusForce™ PAHT-CF is specially developed for FDM 3D printing process, and its substrate material is high temperature nylon, which has low density, low moisture absorption, high strength, high abrasion resistance, excellent chemical resistance and high heat resistance. It also has good dimensional stability, no warpage and no shrinkage during the printing process, and can be used with FusFree™ S-PAHT Quick-Remove Support material to solve the problem of poor molding effect on the support surface of complex models.

## Material Properties (v2.0)

Property	Test Method	Typical value		
Density	ISO 1183	1.20 g/cm <sup>3</sup>		
Water absorption	ISO 62: Method 1	1.37 %		
Melting Temperature	ISO 11357	237°C		
Melt index	300°C, 2.16kg	3.4 g/10min		
		Unannealed	Annealed	Saturation hygroscopic treatment after annealed
Determination of temperature	ISO 75: Method A (1.80 MPa)	82.0°C	117.5°C	101.5°C
	ISO 75: Method B (0.45MPa)	84.8°C	190.7°C	194.5°C
Tensile strength (X-Y)	ISO 527	93.15±1.64 MPa	95.53±3.62 MPa	94.51±2.15 MPa
Young's modulus (X-Y)		7492.51±329.13 MPa	8114.10±539.02 MPa	7269.74±682.72 MPa
Elongation at break (X-Y)		1.92±0.10 %	1.52±0.11 %	2.33±0.20 %
Bending strength (X-Y)	ISO 178	144.00±1.87 MPa	141.82±4.34 MPa	157.53±5.78 MPa

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Bending modulus (X-Y)		6727.22±382.20 MPa	7098.40±440.49 MPa	6983.35±474.51 MPa
Charpy impact strength (X-Y)	ISO 179	10.37±0.27 KJ/m <sup>2</sup>	5.62±0.67 KJ/m <sup>2</sup>	8.61±1.64 KJ/m <sup>2</sup>
Tensile strength (Z)	ISO 527	51.03±2.18 MPa	/	/
Young's modulus (Z)		3869.82±174.36 MPa	/	/
Elongation at break (Z)		1.56±0.07 %	/	/

Specimens printed under the following conditions: Nozzle temp 320°C, Bed temp 80°C, Print speed 45mm/s, Infill 100%, Infill angle ±45°

Post-processing: 100°C Annealing 8 hours

## Recommended printing conditions

Nozzle Temperature	300-320°C
Recommended Nozzle Diameter	0.4-1.0 mm
Recommended build surface treatment	PEI or Coating with PVP glue
Build plate temperature	70-90°C
Raft separation distance	0.12-0.16 mm
Cooling fan speed	OFF
Print speed	30-120 mm/s
Retraction distance	1-3 mm
Retraction speed	1800-3600 mm/min
Recommended support material	FusFree™ S-PAHT Quick-Remove Support

### Additional suggestion

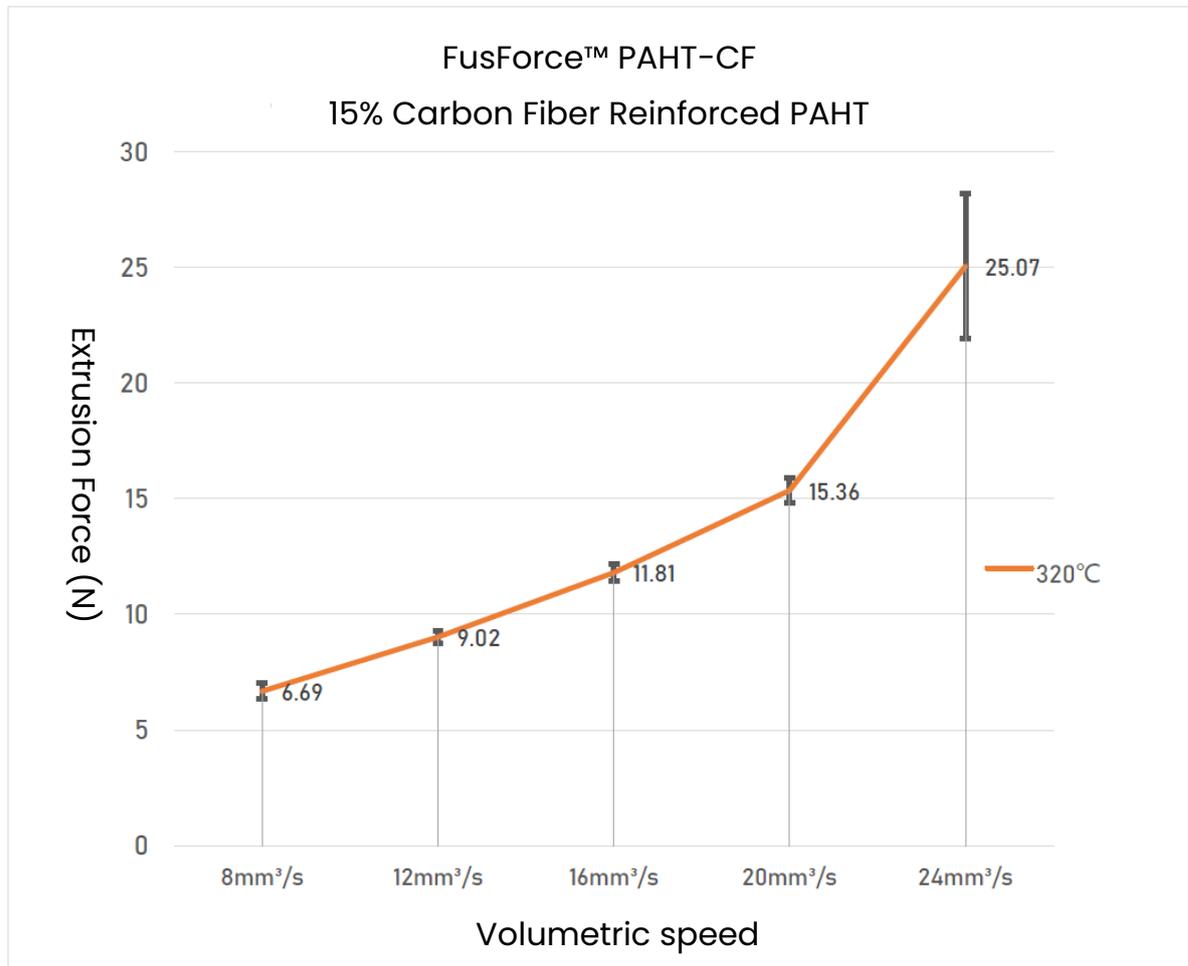
1. Nylon material is very easy to absorb moisture within the environment, and printing after absorbing moisture will result oozing, extruding with bubbles and rough surface appearance, thus reducing print quality. It is recommended that put the filament into a dry box (humidity below 15%) immediately after opening the FusForce™ PAHT-CF vacuum foil bag for printing. Please put the unused filament back into the original aluminum foil bag for sealed storage.

2. After the material is damp, there will be more printing oozing, bubbles extruded and rough printing surface. Please dry the filament in an oven at 80-100°C for 4-6h to restore the printing quality of FusForce™ PAHT-CF.

3. It is recommended to use hardened steel and above grade nozzles made by Phaetus, which can effectively improve the print quality. Besides, it is recommended that the thickness of the heating block is longer 12mm.

4. After the printing is completed, the FusForce™ PAHT-CF printed part can be annealed to further improve the strength of print part. Annealing conditions: leave printing part in an oven at 80-100°C for 4 to 8 hours and cool to room temperature naturally.

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**Extrusion Force vs Print Volumetric Speed****Test**

Test parameters: 20mm length brass heat block, BMG extruder, Phaetus Hardened Steel Nozzle, Nozzle size 0.4mm, Layer Height 0.2mm.