aeForce™ FDM Printing Material
Technical Data Sheet

aeForce™ PAHT-CF

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

15%短切碳纤维增强特种高温尼龙 3D 打印材料

Product Advantages

产品亮点

- **Smart Fiber Reinforced Technology**

Phaetus® 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.

- 智能纤维增强技术

通过生产工艺控制增强纤维在材料基体内的分散与分布，使增强纤维在材料内形成网状骨架结构，并承受大部分由材料基体传递的载荷。Smart Fiber Reinforced Technology 大幅度提高了材料的机械性能和耐热性，并通过增强纤维网状结构释放了打印过程中的内应力，打印件尺寸稳定性好，无翘曲问题。

- **Low Moisture Sensitivity**

aeForce™ 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.

- 低吸湿性

aeForce™ PAHT-CF 基材使用高温尼龙，饱和吸湿率仅为普通 PA6 的十分之一，彻底解决尼龙材料吸湿前后机械性能与尺寸稳定性变化极大的缺陷。

- **Super Abrasive Resistance**

aeForce™ 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..

- 超强耐磨性

aeForce™ PAHT-CF 摩擦系数低，具有自润滑性，耐磨性极佳。轻松实现各类高强度齿轮和耐磨要求工业应用。

Product Description

产品简介

aeForce™ 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 aeSupport™ S-PAHT Quick-Remove Support material to solve the problem of poor molding effect on the support surface of complex models.

aeForce™ PAHT-CF 专为 FDM 3D 打印工艺开发，基材选用高温尼龙，具有低吸湿，高强度，高耐磨性，耐化学性优异和高耐热性的特点。打印过程中尺寸稳定性好，无翘边无收缩现象，并且可以与 aeSupport™ S-PAHT 易剥离支撑材料配合使用，解决复杂模型支撑面成型效果差的难题。

Available

产品详情

Color: Black

颜色：黑色

Diameter: 1.75mm/2.85mm

Net wet: 1KG, 2.5KG, 3KG

Material Properties

物性表

测试项目 Property	测试方法 Test method	典型值 Typical value
测试项目 Property	测试方法 Test Method	典型值 Typical value
密度 Density	ISO 1183	1.20 g/cm³
饱和吸湿率 Water absorption	ISO 62: Method 1	1.37 %
熔点 Melting Temperature	ISO 11357	237°C

熔融指数 Melt index	300℃, 2.16kg	3.4 g/10min		
		未退火 Unannealed	退火后 Annealed	退火后 饱和吸湿处理 Saturation hygroscopic treatment after annealed
热变形温度 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
拉伸强度（X-Y） Tensile strength(X-Y)	ISO 527	93.15±1.64 MPa	95.53±3.62 MPa	94.51±2.15 MPa
拉伸模量（X-Y） Young's modulus(X-Y)		7492.51±329.13 MPa	8114.10±539.02 MPa	7269.74±682.72 MPa
断裂伸长率（X-Y） Elongation at break (X-Y)		1.92±0.10 %	1.52±0.11 %	2.33±0.20 %
弯曲强度（X-Y） Bending strength (X-Y)	ISO 178	144.00±1.87 MPa	141.82±4.34 MPa	157.53±5.78 MPa
弯曲模量 （X-Y） Bending modulus (X-Y)		6727.22±382.20 MPa	7098.40±440.49 MPa	6983.35±474.51 MPa
缺口冲击强度 （X-Y） Charpy impact strength （X-Y）	ISO 179	10.37±0.27 KJ/㎡	5.62±0.67 KJ/㎡	8.61±1.64 KJ/㎡
拉伸强度 (Z) Tensile strength (Z)	ISO 527	51.03±2.18 MPa	/	/
拉伸模量（Z） Young's modulus (Z)		3869.82±174.36 MPa	/	/
断裂伸长率（Z） Elongation at break (Z)		1.56±0.07 %	/	/

试样打印参数：喷嘴温度 320℃，底板加热 80℃，打印速度 45mm/s，填充率 100%，填充角度 ±45°

退火条件：100℃退火 8 小时

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

Post-processing: 100°C Annealing 8 hours

Recommended Printing Conditions

建议打印参数

喷头温度 Nozzle Temperature	300-320°C
建议喷嘴大小 Recommended Nozzle Diameter	0.4-1.0 mm
建议底板材质 Recommended build surface treatment	PEI 底板或者涂抹 PVP 固体胶 PEI or Coating with PVP glue
底板温度 Build plate temperature	70-90°C
Raft 间距 Raft separation distance	0.12-0.16 mm
冷却风扇 Cooling fan speed	关闭 OFF
打印速度 Print speed	30-120 mm/s
回抽距离 Retraction distance	1-3 mm
回抽速度 Retraction speed	1800-3600 mm/min
建议支撑材料 Recommended support material	aeSupport™ S-PAHT Quick-Remove Support

其他建议：

1. 尼龙材料非常容易吸收环境内的水分，吸湿后打印会出现拉丝，挤出有气泡等现象，降低打印质量。建议您打开 aeForce™ PAHT-CF 真空铝箔袋包装后立即将线材放入干燥盒内（湿度控制在 15%以下）进行打印。不用的线材请放回原包装铝箔袋内密封保存。

   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 aeSupport™ S-PAHT vacuum foil bag for printing. Please put the unused filament back into the original aluminum foil bag for sealed storage.

2. 材料受潮后会出现打印拉丝增多，挤出有气泡，打印表面质量粗糙等现象。请将线材放入 80-100℃烘箱内干燥 4-6h，即可恢复 aeForce™ PAHT-CF 的打印质量。

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℃ for 4-6h to restore the printing quality of aeForce™ PAHT-GF.

3. 建议选用 Phaetus 硬化钢及以上等级喷嘴，可以有效提高打印质量，建议加热块厚度不小于 12mm。

   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. 打印完成后可以对打印件进行退火处理，可以进一步提高 aeForce™ PAHT-CF 打印件的强度，退火条件：80-100℃温度下放置 4-8 小时后取出即可。

   After the printing is completed, the aeForce™ 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℃ for 4 to 8 hours and cool to room temperature naturally.

Extrusion Force vs Print Speed Test

建议打印参数挤出压力与打印测试报告

aeForce™ PAHT-CF
15% Carbon Fiber Reinforced PAHT

挤出压力 (N)
Extrusion Force (N)

320℃

6.69 9.02 11.81 15.36 25.07

8mm³/s 12mm³/s 16mm³/s 20mm³/s 24mm³/s

打印体积速度
Volumetric speed