FusRock® FDM 3D Printing Material
Technical Data Sheet

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FusForce™ PET-CF

15%短切碳纤维增强涤纶聚酯 3D 打印材料。

15% chopped carbon fiber reinforced Polyethylene Terephthalate FDM material.

产品亮点

Product Advantages

- **智能纤维增强技术**

  FusRock®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 Techonology 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。

- **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.

- **低蠕变性**

  PET 分子链结构高度规整，并具有刚性的苯环结构。使得 PET 具有较好的力学性能，长期载荷下变形量较小，相比 PA 和 PC 材料具有更加优良的耐蠕变性能。

- **Low creep**

  The molecular chain structure of PET is highly regular and has a rigid benzene ring structure, so that PET has better mechanical properties and less deformation under long-term load. Compared with PA and PC materials, PET has better creep-resistance.

产品详情

Available

颜色 Color：黑色 Black

线径 Diameter：1.75mm/ 2.85mm

净重 Net Weight：500g, 1kg, 2.5kg, 3kg

产品介绍

Product Description

FusForce™ PET-CF 专为 FDM 3D 打印工艺开发，基材选用 PET 工程材料，具有低吸湿，高强度，耐蠕变，耐溶剂和高耐热性的特点。打印过程中尺寸稳定性好，无翘边，无收缩现象，无气味，无需环境保温。并且可以与 FusFree™ S-Multi 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。

FusForce™ PET-CF is specially developed for FDM 3D printing process, and its substrate material is PET engineering plastic with low moisture absorption, high strength, creep resistance, excellent chemical resistance and high heat resistance. With good dimensional stability, no warpage and no shrinkage and no smell, no heating chamber are required during the printing process. It can be used with FusFree™ S-Multi Quick-Remove Support Material to solve the problem of poor molding effect of supporting surface of complex model.

物性表（v1.2）

Material Properties

测试项目 Property	测试方法 Test Method	典型值 Typical value		
密度 Density	ISO 1183	1.30 g/cm³		
饱和吸湿率 Water absorption	ISO 62: Method 1	0.5 %		
熔点 Melting Temperature	ISO 11357	251 °C		
熔融指数 Melt index	270°C, 2.16kg	6.8		
		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)	76.6°C	115.6°C	105.4°C
	ISO 75: Method B (0.45 MPa)	86.7°C	175.4°C	174.5°C
拉伸强度（X-Y） Tensile strength(X-Y)	ISO 527	72.51±1.39 MPa	70.82±2.74 MPa	67.97±2.64 MPa
拉伸模量（X-Y） Young's modulus(X-Y)		5730.88±200.63 MPa	6208.45±462.92 MPa	6227.90±543.32 MPa
断裂伸长率（X-Y） Elongation at break (X-Y)		2.49±0.22 %	1.46±0.10 %	1.47±0.10 %
弯曲强度（X-Y） Bending strength (X-Y)	ISO 178	114.47±1.89 MPa	110.79±3.36 MPa	108.47±3.72 MPa
弯曲模量 （X-Y） Bending modulus (X-Y)		5345.71±231.24 MPa	5588.24±363.94 MPa	5669.56±333.24 MPa

缺口冲击强度 （X-Y） Charpy impact strength (X-Y)	ISO 179	7.75±1.08 KJ/㎡	4.59±0.15 KJ/㎡	4.30±0.28 KJ/㎡
拉伸强度 (Z) Tensile strength (Z)	ISO 527	34.13±0.93 MPa	/	/
拉伸模量（Z） Young's modulus (Z)		3270.44±62.77 MPa	/	/
断裂伸长率（Z） Elongation at break (Z)		1.20±0.04 %	/	/

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

退火条件：100°C 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

建议打印参数

Recommended printing conditions

喷头温度 Nozzle Temperature	280-320 °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	60-80 °C
Raft 间距 Raft separation distance	0.08-0.12 mm
冷却风扇 Cooling fan speed	关闭 OFF
打印速度 Print speed	30-120 mm/s
最大挤出流量 Max Extrusion Volumetric Speed	28mm³/s, 320°C

回抽距离 Retraction distance	0.4-1 mm
回抽速度 Retraction speed	1800-3600 mm/min
建议支撑材料 Recommended support material	FusFree™ S-Multi Quick-Remove Support

其他建议：

Additional Suggestions：

1. PET 材料虽然吸湿率极低，但对水分却非常敏感。材料吸湿后打印会出现拉丝，挤出有气泡，打印表面粗糙等现象，降低打印质量。建议您打开 FusForce™ PET-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。

   Although the moisture absorption of PET material is very low, it is very sensitive to moisture. Printing after absorbing moisture will result in ozzing, 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™ PET-CF 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 90°C 烘箱内干燥 6-8h，即可恢复 FusForce™ PET-CF 的打印质量。

   After the material is damp, there will be more printing ozzing, bubbles extruded and rough printing surface. Please dry the filament in an oven at 90°C for 6-8h to restore the printing quality of FusForce™ PET-CF.

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。

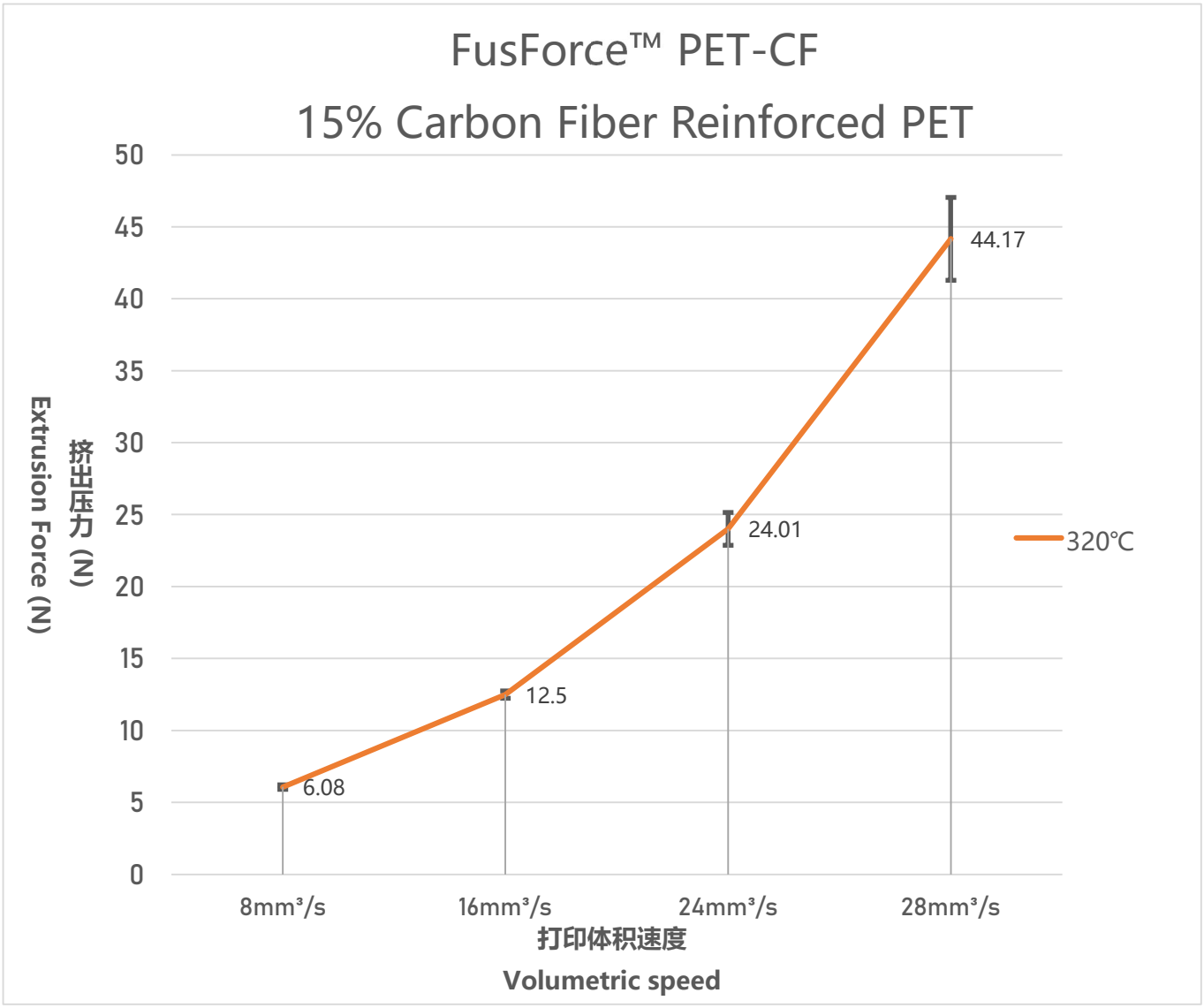
   Phaetus hardened steel and above grade nozzles shall be selected, which can effectively improve the print quality. Besides, it is recommended that the thickness of the heating block should no less than 12mm.

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 FusForce™ PET-CF 打印件的强度，退火条件：90-120°C 温度下放置 6-12 小时后自然冷却到室温。

   After the printing, the printed part can be annealed to further improve the strength of FusForce™ PET-CF print part. Annealing conditions: place the printed part at 90-120°C for 8-12 hours and cool to room temperature naturally.

挤出压力与打印流量速度测试

Extrusion Force vs Print Volumetric Speed Test



测试参数：20mm 长度铜制加热块，BMG 挤出机，Phaetus 硬化钢喷头，喷嘴大小 0.4mm，层高 0.2mm。

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