# FusRock® FDM 3D Printing Material
# Technical Data Sheet

**Data / Revised: 02.2026** **Version No: 2.0**

## FusFlex™ TPU-Aero

主动发泡轻量化柔性 3D 打印材料

Active foaming low weight TPU 3D print material

## 产品介绍

## Product Description

FusFlex™ TPU-Aero 是一款专为 FFF 打印技术开发的中等硬度主动发泡型柔性材料，通过控制打印温度，可以实现不同的挤出发泡倍率，最终呈现出不同的减重和柔软度效果。FusFlex™ TPU-Aero 打印件表面硬度可控制在 65A-85A 之间。在最大发泡率下，FusFlex™ TPU-Aero 相比普通 TPU 材料可以减重 50%，打印表面具有出色的类布艺质感。

FusFlex™ TPU-Aero is a medium-hardness, active foaming flexible material specifically developed for FFF printing technology. By controlling the printing temperature, different extrusion foaming ratios can be achieved, resulting in varying weight reduction and softness effects. The surface hardness of FusFlex™ TPU-Aero printed parts can be controlled between 65A and 85A. At the maximum foaming rate, FusFlex™ TPU-Aero can reduce weight by 50% compared to ordinary TPU materials, with the printed surface exhibiting an excellent fabric-like texture.

## 产品亮点

## Product Advantages

- 主动发泡技术

  FusFlex™ TPU-Aero 是一款在打印过程中进行发泡的柔性 TPU 材料。FusRock® 通过特殊的挤出加工工艺，将发泡组分在未激活的状态下均匀分布在 TPU 基材内部，使得整卷产品重量仍然保持在 1kg，未有减少。在打印过程中通过调节打印温度可以自由控制发泡组分的膨胀倍率，实现不同的减重和柔软度效果，满足不同应用要求。

  FusFlex™ TPU-Aero is a flexible TPU material that foams during the printing process. FusRock® uses a special extrusion processing technique to uniformly distribute the foaming components within the TPU matrix in an unactivated state, ensuring that the entire spool of material remains at 1kg without weight reduction. By adjusting the printing temperature, the expansion ratio of the foaming

components can be freely controlled, achieving different weight reduction and softness effects to meet various application requirements.

- 易于打印

  FusFlex™ TPU-Aero 通过特殊的挤出加工工艺，避免了发泡组分在线材内发泡后会大幅度降低线材硬度的缺陷。未激活的发泡组分充当刚性颗粒均匀分布在 TPU 基材内，有效提高了 FusFlex™ TPU-Aero 线材的表面硬度，降低了打印难度。 FusFlex™ TPU-Aero 兼容大部分打印机打印，最大挤出流量可达 12mm³/s。

  FusFlex™ TPU-Aero avoids the defect of significantly reduced filament hardness after foaming by using a special extrusion processing technique. The unactivated foaming components act as rigid particles uniformly distributed within the TPU matrix, effectively increasing the surface hardness of the FusFlex™ TPU-Aero filament and reducing printing difficulty. FusFlex™ TPU-Aero is compatible with most printers, with a maximum extrusion flow rate of 12mm³/s.

## 产品详情

## Available

颜色 Color：白色 White/ 黑色 Black/ 鲜绿色 Bright Green

线径 Diameter：1.75mm

净重 Net Weight：500g/ 1kg

## 材料（线材）物性表

## Filament Material Properties

| 测试项目<br>Property | 测试方法<br>Testing method | 典型值<br>Typical value |
|---|---|---|
| 线材密度<br>Filament Density | ISO 1183 | 1.15 g/cm³ |
| 熔融指数<br>Melt index | 190°C，2.16kg | 8 |
| 饱和吸湿率<br>Water absorption | ISO 62:<br>Method 1 | 5.82 % |

## 建议打印流量与温度对照表

## Recommended Print Flow Ratio vs Print Temperature

| 热端尺寸*<br>Hotend Size* | 打印发泡效果<br>Foaming effect | 220°C | 230°C** | 240°C** | 250°C** | 260°C |
|---|---|---|---|---|---|---|
| 0.4mm Hardened Steel | 设定流量<br>Flow Ratio | / | F0.90 | F0.76 | F0.66 | F0.56 |
| | 硬度<br>Hardness | / | 81A | 79A | 74A | 66A |
| | 密度<br>Density | / | 1.03g/cm$^3$ | 0.89g/cm$^3$ | 0.78g/cm$^3$ | 0.64g/cm$^3$ |
| 0.6mm Hardened Steel | 设定流量<br>Flow Ratio | F0.82 | F0.72 | F0.56 | F0.50 | / |
| | 硬度<br>Hardness | 82A | 79A | 71A | 66A | / |
| | 密度<br>Density | 0.95g/cm$^3$ | 0.84g/cm$^3$ | 0.65g/cm$^3$ | 0.58g/cm$^3$ | / |

***流量数据基于使用 Bambu Lab H2D 打印测试**

***Flow ratio based on printing test using Bambu Lab H2D**

****建议打印温度区间**

**** Recommended printing temperature range**

**▲由于不同打印机热端硬件不同，建议首次打印进行手动流量校准，找出适配当前打印温度下的最佳挤出流量。**

**▲Given that different printers have varying hotend hardware, it is advisable to perform a manual flow calibration for the first print to determine the optimal extrusion flow at the current printing temperature.**

## 打印件机械性能

## Mechanical Properties of Printed Specimens

| 样条打印温度/Specimens print temperature | | 220°C | 230°C | 240°C | 250°C |
|---|---|---|---|---|---|
| 设定挤出量/ Flow ratio | | 0.84 | 0.74 | 0.62 | 0.52 |
| 打印件密度<br>Print parts density | ISO 845 | 0.95 g/cm³ | 0.84 g/cm³ | 0.65 g/cm³ | 0.58 g/cm³ |
| 维卡软化点<br>Vicat softening temperature | ISO 306 | 79.5 °C | 75.8 °C | 62.3 °C | 49.8 °C |
| 硬度<br>Hardness | ISO 7619 | 82A | 79A | 71A | 66A |
| 回弹性<br>Bayshore rebound | ASTM D2632 | 33 % | 33 % | 33 % | 33 % |
| 压缩永久变形<br>Permanent compression set | ISO 815-1 | 39 % | 27 % | 42 % | 51 % |
| 拉伸断裂强度（X-Y）<br>Tensile breaking strength (X-Y) | ISO 1798 | 10.56±0.32 MPa | 7.75±0.23 MPa | 5.25±0.05 MPa | 3.92±0.04 MPa |
| 断裂伸长率(X-Y)<br>elongation at break (X-Y) | | 666.29±46.49 % | 558.04±34.79 % | 545.54±25.55 % | 424.29±18.35 % |
| Z 方向撕裂强度（Z）<br>Tear Strength（Z） | ISO 34-1 | 41.03±2.51 KN/m | 34.61±2.99 KN/m | 24.96±2.25 KN/m | 16.24±0.91 KN/m |

**试样打印参数：打印平台 Bambu Lab H2D，**喷嘴大小 0.6mm，打印层高 0.3mm，底板加热 45°C，打印速度 60mm/s，填充率 100%，填充角度±45°

**Specimens printed under the following conditions: Printer Bambu Lab H2D, Nozzle size 0.6mm，Layer height 0.3mm, Bed temp 45°C, Print speed 60mm/s, Infill 100%, Infill angle ±45°**

## 建议打印参数

## Recommended printing conditions

| | |
|---|---|
| 喷头温度<br>Nozzle temperature | 220-260°C |
| 建议喷嘴大小<br>Recommended nozzle diameter | 0.4mm-0.8mm |
| 建议底板材质<br>Recommended build surface | PEI 涂层或 PEI 贴膜底板（取件时需配合喷洒酒精）<br>PEI film or PEI coated build surface(Spray alcohol to help remove print parts) |
| 底板温度<br>Build plate temperature | 30-45°C |
| 冷却风扇<br>Cooling fan speed | On |
| 打印速度<br>Print speed | < 100 mm/s |
| 回抽距离<br>Retraction distance | 0mm or Off |

其他建议：

1. TPU 材料暴露在空气中容易吸收水分，建议您打开 FusFlex™ TPU-Aero 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。
   TPU materials are prone to absorb moisture when exposed to air. It is recommended to place the FusFlex™ TPU-Aero filament into a dry box (humidity controlled below 15%) immediately after opening the vacuum aluminum foil packaging. Unused filament should be sealed back in the original aluminum foil packaging.

2. 长时间暴露于空气中的 TPU-Aero 线材，请先将线材放入 70-80°C 烘箱内干燥 4-6h 后进行打印，避免材料潮湿使得挤出线条中存在气泡、孔洞，拉丝等问题。
   For FusFlex™ TPU-Aero filament that has been exposed to air for a long time, it is recommended to dry the filament in an oven at 70-80°C for 4-6 hours before printing to avoid issues such as bubbles, holes, or stringing caused by moisture.

3. 由于发泡类材料在热端融腔内受热会不断膨胀，空驶时会不可避免的出现漏料情况，即使调节回抽距离和回抽

速度也无法改善，建议在切片软件中关闭回抽功能，一次仅打印单个模型或使用逐件打印功能，减少因长距离空驶和跳跃造成的拉丝和漏料缺陷。

Due to the continuous expansion of foaming materials in the hot end chamber, leakage is inevitable during travel movement. Even adjusting retraction distance and speed cannot improve this. It is recommended to disable retraction in the slicing software, print only one model at a time, or use the print-by-part function to reduce stringing and leakage caused by long-distance idle movements and jumps.

4. 部分 PEI 涂层或 PEI 贴膜的打印底板可能会对 TPU 类材料粘接力过牢，取件时请不要用力拉扯模型，容易造成打印件底部破损，请喷洒少量酒精在打印件底部边缘，稍等数秒钟，待酒精液体渗透进打印件与 PEI 底板间的缝隙后即可轻松取下模型。或者建议使用无涂层的不锈钢板并涂抹少量 PVP 胶水后作为构建底板。

Some of PEI textured or PEI film build plates may exhibit excessive adhesion to TPU materials, avoid forceful removal to prevent base layer damage. Apply a small amount of isopropyl alcohol (99%) to the edge regions of the model's base. Wait 10-20 seconds to allow capillary penetration between the model and PEI surface, enabling non-destructive release. Alternatively, use an uncoated stainless steel build plate with a thin layer of polyvinylpyrrolidone (PVP) adhesive for controlled interfacial separation.