



## Technical Data Sheet

# TPU

### Product overview

Professional Lab TPU 3D printing filament is developed through meticulous research and innovation, presenting a high-quality option for 3D printing enthusiasts. Unlike many general-purpose filaments, it offers a unique set of properties that make it stand out in the market, providing a remarkable 3D printing experience and high-quality printed items.

### Product features

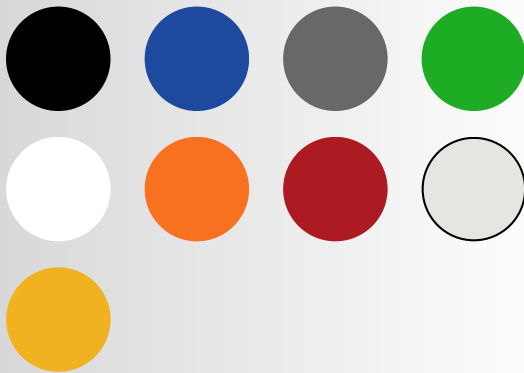
**Exceptional flexibility and elasticity:** TPU is renowned for its outstanding flexibility. The printed objects have excellent stretchability and can return to their original shape after being deformed, making it ideal for applications such as flexible phone cases, wearable devices, and shock-absorbing components.

**High tear resistance:** It has remarkable tear-resistant properties. The printed parts can endure substantial pulling and stretching forces without easily tearing, ensuring long-term durability and reliability in various usage scenarios.

**Good chemical resistance:** Professional Lab TPU filament shows decent resistance to a wide range of chemicals. This property makes the printed products suitable for use in environments where they may come into contact with different substances, expanding their application scope.

**Outstanding printability:** It has been engineered to have optimal printability. The filament has a smooth extrusion process during 3D printing, with consistent flow and good adhesion to the print bed. It can accurately replicate intricate model designs and fine details, reducing the likelihood of printing failures and providing a high-quality finish.

### Available colors



## Printing Recommendations

- Nozzle temperature: 205 – 235°C
- Build surface material: PEI, glass
- Build surface treatment: glue
- Build plate temperature: 50 – 60°C
- Shore hardness: 95A
- Cooling fan: 1
- Printing speed: 30 – 70 mm/s
- Raft separation distance: 0.2 mm
- Retraction distance: 7 mm
- Retraction speed: 20 mm/s
- Environmental temperature: room temperature – 60°C
- Threshold overhang angle: 60°

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

## Mechanical properties

| Property            | ASTM standard test condition | SI Unit | Typical value     |
|---------------------|------------------------------|---------|-------------------|
| Tensile Strenght    | ASTM D638, 50 mm/min         | MPa     | 21.7              |
| Young's modulus     | ASTM D638, 1 mm/min          | MPa     | 50.2              |
| Elongation at break | ASTM D638, 50 mm/min         | %       | 536               |
| Flexural strenght   | ASTM 790, 2 mm/min           | MPa     | 4.26              |
| Flexurel modulus    | ASTM D790, 2 mm/min          | MPa     | 87.6              |
| IZOD impact notched | ASTM D256, 3.2 mm/23°C       | J/m     | Non - destructive |

## Mechanical properties

| Property                          | ASTM standard test condition | SI Unit | Typical value |
|-----------------------------------|------------------------------|---------|---------------|
| Heat deflection temperature (HDT) | ASTM D638, 0.45 Mpa          | °C      | 52            |
| 5% decomposition temperature      | ASTM E2402, 20°C per minute  | °C      | ≥300          |

## Drying recommendations

To guarantee optimal printing results, it's crucial to dry Professional Lab TPU filaments before use. TPU is highly hygroscopic, and if the filaments are exposed to a humid environment, absorbed moisture can severely disrupt the printing process, leading to issues such as poor layer adhesion, stringing, and uneven surfaces.

A specialized 3D printing filament dryer is the ideal choice. Set the temperature at around 60°C and let the filaments dry for 1 hour. In the absence of a dedicated dryer, a household oven can be an alternative, but exercise extreme caution to regulate the temperature and duration precisely, as TPU is sensitive to heat and can easily deform.

## Precautions

**Elasticity and deformation issue:** while TPU offers excellent elasticity, improper printing conditions can still cause deformation. During printing, maintaining a stable printing temperature is essential. Consider using a 3D printer with a heated build plate and a semi-enclosed or enclosed printing chamber to minimize temperature fluctuations. This helps the TPU solidify evenly and retain its desired shape.

**Cooling management:** TPU has unique cooling requirements. Due to its soft and elastic nature, rapid cooling can lead to internal stress and distortion. When using cooling fans, adjust the speed to a low or medium setting. For complex models with thin-walled or intricate structures, it may be necessary to further reduce the fan speed or even turn it off during critical printing stages to ensure proper cooling and shape retention.

**Filament storage:** store TPU filaments in a dry, dark, and cool environment. Direct sunlight can degrade the material's properties over time, and humidity can cause it to absorb moisture. Seal unused filaments in airtight containers with desiccant packs to keep them dry and ready for future use.

**Printer compatibility:** before using Professional Lab TPU filaments, verify that your 3D printer is compatible. TPU's flexibility can pose challenges for some feeding systems, so ensure that your printer's extruder is designed to handle flexible filaments. Additionally, check the recommended nozzle diameter, as TPU may require a larger nozzle compared to other materials to facilitate smooth extrusion.

## Disclaimer of Liability

The typical values provided in this datasheet are for reference and comparison only. They should not be used as design specifications or for quality control. Actual values may vary depending on print conditions. The performance of printed parts depends not only on the material but also on design, environment, and print parameters.

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