**Specification of TPU**

**Writer： Proofreader： Translator: Reviewers：**

①**Background**

In the actual market, customers need some filaments that have higher elasticity than PLA. TPU is a soft material and can be used for printing elastic objects.

②**Main Ingredients**

TPU, color additive.

③**Features**

* Flexible material with the same elasticity as rubber.
* The thinner and less filled the printed model is, the higher elasticity and softness it gets.
* Low viscosity, easy to cooling.
* Uvioresistant.

④**Application and Target Audience**

Generally used for printing elastic products, suitable for all groups who want to print soft models.

⑤**Technical Specification**

* Filament Diameter: 1.75mm
* Tolerance: ±0.05mm
* Printing Temperature: 200°C-220°C
* Heated Bed Temperature: 0°C-60°C/ without heating
* Printing Speed: 15-40mm/s

**⑥Shortcomings**

* TPU is soft material, so the filament can't be rolled neatly.
* The material itself is soft and does not bear any force. It is recommended to use the direct drive extruder to get a good printing experience. The remote extruder can only print normally after modification.
* Bowden extruder is difficult to use and requires high level of users.

**⑦Relevant Parameters of Recommended Machine Types**

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| Relevant Parameters of Recommended Machine Types |
| Type | Extruder Type/Heated Bed Type | Parameter |
| Prusa i3 | Direct Drive Extruder/PEI Bed Sticker | Printing Temperature: 200-210℃Heated Bed Temperature: 0-50℃/without heatingPrinting Speed: 15-30mm/sRetracting Length: 0.8mmRetracting Speed: 30-40mm/s |

**Basic Parameters**

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| **TPU Basic Parameter** |
| Physical Properties | Typical Value | Method |
| Specific Gravity [g/cm3] | 1.21 | ISO 1183 |
| Moisture Absorption 24 h [%] (2) | / | / |
| Moisture Absorption 7 day [%] (2) | / | / |
| Moisture Absorption 4 weeks [%] (2) | / | / |
| Heat Deflection Temperature (0,45MPa) | / | ISO 75 |
| Tensile Yield Strength Filament [MPa] | 40 | ASTM D412 |
| Shore Hardness | 95A |  |
| Explain |  |  |
| (1) 2.16kg; 210℃ |  |  |
| (2) 28℃; humidity: 37% |  |  |

Table 1

## ⑧FAQ

1.Q: Can I use TPU on Bowden Extruder printer?

A: Yes. The material itself is soft and does not bear any force. It is recommended to use the direct drive extruder to get a good printing experience. The remote extruder can only print normally after modification.

2.Q: Does the hot bed temperature need to be set?

A: No, you don't have to. You can print objects normally when the heated bed is at room temperature.

3.Q: Why my filament tangles? How can I solve it?

A: The tangle of filament isn’t caused by the disordered or the imperfect winding. According to the production technology of filament, the filament winds back and forth (from left to right and then from right to left). Normally, there is no overline tangle. A common cause of tangle is that the filament end is not fixed to the holes of spool. Overline tangle or the changed winding direction make filament tangle. So customers need to fix the filament end to the proper holes of the spool.

4.Q: The nozzle is clogged by TPU, and how can I solve it?

 A: Inconstant filament diameter, the lower nozzle temperature and frequent replacement with different kinds of filaments will lead to this problem. So, before you get started, clean the nozzle and turn up the temperature to a proper value.

5.Q: My prints have web-like strings (stringing) issues. How can I troubleshoot it?

 A: Too high temperature makes the TPU filament melt and flow so fast. Please turn the temperature down to a proper value.

 The retracting parameters are improper, so adjust the retracting length and speed.

6.Q: There are too much melted filament around the nozzle. What should I do?

 A: This problem can be attributed to over-high temperature, low printing speed, and in the slice software, the nozzle diameter doesn’t match with the extrusion output.

7.Q: The surface of my print isn’t very smooth, and the extruded filament has inconstant diameters. Why?

 A: The printing temperature is too high or too low. The temperature doesn’t match well with the printing speed. You need to adjust the printing speed or temperature.