**Specification of PETG**

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

①**Background**

In the actual market, customers need some filaments that have higher toughness, hardness and impact strength than PLA. And customers need some filaments that can be used in the engineering field.

②**Main Ingredients**

PETG, Color Additive.

③**Features**

* Having higher toughness than PLA.
* Having higher hardness than PLA.
* The impact strength is more than 30 times that of standard PLA.
* Elongation at break is more than 50 times that of standard PLA.
* Adhesive force is stronger than that of PLA.

④**Application**

Suitable for prints (such as hook) having high requirements about the hardness and strength of filaments and for that having strong heat-resistance (such as transparent lampshade).

⑤**Technical Specification**

* + - Filament Diameter: 1.75mm
    - Tolerance: ±0.03mm
    - Printing Temperature: 230°C-250°C
    - Heated Bed Temperature: 70-85°C
    - Printing Speed: 30-80mm/s

**⑥Shortcomings**

PETG is relatively easy to have stringing issues and requires high-temperature printing. It also has certain requirements about the performance of printers.

**⑦Relevant Parameters of Recommended Machine Types**

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| --- | --- | --- |
| Relevant Parameters of Recommended Machine Types | | |
| Type | Extruder Type/Heated Bed Type | Parameter |
| Creality Ender 3 | Bowden/Flexible Bed Sticker | Printing Temperature: 230-240℃  Heated Bed Temperature: 70-80℃  Printing Speed: 30-65mm/s  Retracting Length: 2-4mm  Retracting Speed: 60-100mm/s |
| Creality CR-10 | Bowden/Glass Bed | Printing Temperature: 230-240℃  Heated Bed Temperature: 75-85℃   Printing Speed: 30-60mm/s  Retracting Length: 2-5mm  Retracting Speed: 80-110mm/s |
| Anycubic Mega-S | Bowden/ Microporous Coating Glass Bed | Printing Temperature: 230-240℃  Heated Bed Temperature: 75-85℃  Printing Speed: 30-80mm/s  Retracting Length: 2-4mm  Retracting Speed: 70-100mm/s |
| Prusa i3 | Direct Drive Extruder/PEI Bed Sticker | Printing Temperature: 230-240℃  Heated Bed Temperature: 70-80℃  Printing Speed: 30-100mm/s  Retracting Length: 0.8mm  Retracting Speed: 30-40mm/s |
| Eryone Thinker S | Bowden/PEI Bed Sticker | Printing Temperature: 230-240℃  Heated Bed Temperature: 70-80℃  Printing Speed: 30-60mm/s  Retracting Length: 4mm  Retracting Speed: 90-110mm/s |
| Eryone Thinker SE | Bowden/Glass Bed | Printing Temperature: 230-240℃  Heated Bed Temperature: 75-85℃  Printing Speed: 30-70mm/s  Retracting Length: 4mm  Retracting Speed: 80-110mm/s |
| Eryone Thinker ER-20 | Bowden/Silk-Screen Glass Bed | Printing Temperature: 230-240℃  Heated Bed Temperature: 75-85℃  Printing Speed: 30-100mm/s  Retracting Length: 2-5mm  Retracting Speed: 80-110mm/s |

**⑧Basic Parameters**

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| --- | --- | --- |
| **PETG Basic Parameter** | | |
| Physical Properties | Typical Value | Method |
| Specific Gravity [g/cm3] | 1.27 | ISO 1183 |
| Moisture Absorption 24 h [%] (2) | / | / |
| Moisture Absorption 7 day [%] (2) | / | / |
| Moisture Absorption 4 weeks [%] (2) | / | / |
| Heat Deflection Temperature (0,45MPa) | 72.9 | ISO 75 |
| Tensile Yield Strength Filament [MPa] | 51 | ISO 527-1 |
| Explain |  |  |
| (1) 2.16kg; 210℃ |  |  |
| (2) 28℃; humidity: 37% |  |  |

Table 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Mechanical Strength of** **PETG Standard Printed Objects** | | | | |
| Property / Print Direction | Horizontal | Vertical X,Y Axis | Vertical Z Axis | Method |
| Tensile Modules [GPa] | / | / | / | ISO 527-1 |
| Tensile Yield Strength [MPa] | 37 | / | / | ISO 527-1 |
| Elongation at Yield Point [%] | 10 | / | / | ISO 527-1 |
| Impact Strength Charpy (2) [kJ/m2] | 53（no notch) | / | / | ISO 179-1 |
|  |  |  |  |  |
| * (1) 1. Used Printer Type 2. Used Slice Software 3. Slice Parameter, Layer Height,   Fill Ratio Printing Speed, Top Layer Number, Bottom Layer Number | 1. Eryone Thinker SE/ER-20 2.Cura/Prusa Slicer  3.205℃，0.2mm,100%,50mm/s, 5,5 | / | / |  |
| (2) Charpy unnotched, edgewise direction of flow according to ISO 179-1 | / | / | / | Place it according to the left picture, use slice software and print it. |

Table 2

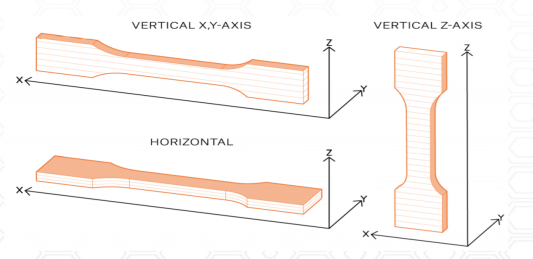


Diagram 1

## ⑨FAQ

1.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.

2. Q: Is PETG degradable?

A: The natural degradation process of PETG raw materials is very long, and PETG is a non-degradable material. PETG is a thermoplastic material, which can be used for secondary plastic recycling. PETG is also an environmentally friendly material.

3.Q: The nozzle is clogged by PETG, 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.

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

A: Too high temperature makes the PETG 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.

5.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.

6.Q: The PETG filament was perfect when I opened the package. After several times of intermittent printing, my PETG filament snaps by accident during printing. Why?

A: Normally, the PETG filament in the printing process will not snap by themselves. However, after being affected by moisture, the degradable material PETG will be more brittle and easier to break, so you should pay attention to dampproof.

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.

8.Q: Why my PETG-printed objects don't stick to the heated bed? How do I solve?

A: The distance between the nozzle and the bed is too far. Make sure your heated bed is levelled and it’s clean. Then judge if the printing temperature and heated bed temperature are too low, and our customers should adjust them to correct ranges.