

# TECHNICAL DATA SHEET (TDS)

## Thermoplastic Polyurethane (TPU) Filament – 65A

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### 1. Product Identification

Parameter	Specification
Material Type	Thermoplastic Polyurethane (TPU)
Hardness	Shore A 65
Filament Diameter	1.75 mm
Processing Method	Fused Deposition Modeling (FDM / FFF)
Appearance	Solid / Translucent (depending on grade)

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### 2. Mechanical Properties

Property	Typical Value	Test Method
Tensile Strength	15 – 25 MPa	ASTM D412 / ISO 37
Elongation at Break	600 – 800 %	ASTM D412 / ISO 37
Tear Strength	50 – 70 kN/m	ASTM D624
Hardness	65 Shore A	ASTM D2240
Abrasion Resistance	≤ 80 mm <sup>3</sup>	ISO 4649
Compression Set (23°C, 24h)	≤ 40 %	ASTM D395

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### 3. Physical Properties

Property	Typical Value	Test Method
Density	1.16 – 1.19 g/cm <sup>3</sup>	ASTM D792
Melt Flow Index (190°C / 2.16 kg)	10 – 20 g/10 min	ASTM D1238
Moisture Absorption (24h)	≤ 1.0 %	ASTM D570

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## 4. Thermal Properties

Property	Typical Value	Test Method
Glass Transition Temperature (T <sub>g</sub> )	~ -35°C	DSC (ISO 11357)
Vicat Softening Temperature	70 – 90°C	ASTM D1525
Service Temperature Range	-35°C to 70°C	Internal Method

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## 5. Printing Parameters (Recommended)

Parameter	Recommended Setting
Nozzle Temperature	220 – 250°C
Build Plate Temperature	40 – 60°C
Print Speed	10 – 30 mm/s
Retraction	Disabled
Cooling Fan	20 – 50 %
Nozzle Diameter	≥ 0.4 mm (0.6 mm recommended)
Extruder Type	Direct Drive Required

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## 6. Rheological & Processing Notes

- TPU 65A is an **ultra-flexible elastomer** with pronounced **viscoelastic behavior**
- Very low stiffness leads to:
  - High risk of filament buckling
  - Sensitivity to extrusion pressure and feed path resistance

- Recommended machine setup:
    - Fully constrained filament path
    - Low acceleration and jerk settings
    - Consistent extrusion flow tuning
  - Bowden systems are **not recommended** due to compression and feeding instability
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## 7. Chemical Resistance

Exposure	Performance
Oils & Greases	Excellent
Aliphatic Hydrocarbons	Good
Acids (Dilute)	Moderate
UV Resistance	Moderate (UV stabilizers recommended)
Water	Good

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## 8. Applications

- Soft-touch and rubber-like consumer products
  - Wearables (bands, straps, cushioning components)
  - Seals, gaskets, and flexible joints
  - Shock and vibration dampening parts
  - Medical simulation models (non-certified use)
  - Anti-slip grips and padding components
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## 9. Storage & Drying Conditions

Parameter	Recommendation
Storage Environment	Sealed, dry container
Relative Humidity	< 20 % RH
Drying Temperature	45 – 55°C
Drying Time	4 – 6 hours

**Note:** TPU is hygroscopic. Moisture may cause:

- Stringing and oozing
  - Surface bubbling
  - Weak layer adhesion
  - Inconsistent extrusion
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## 10. Advantages & Limitations

### Advantages

- Extremely high flexibility and elasticity
- Superior impact absorption and softness
- Excellent damping performance
- Strong interlayer adhesion

### Limitations

- Most challenging TPU grade to print
  - Requires slow print speeds and precise tuning
  - Not suitable for Bowden extrusion systems
  - Moisture sensitive
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## 11. Disclaimer

The values provided in this Technical Data Sheet are **typical values obtained under controlled laboratory conditions** and are intended for reference only. They should not be interpreted as guaranteed specifications. Users are responsible for verifying suitability for their specific applications and processing conditions.