



## Filazoo Filament

Technical Data Sheet V1.0



# TPU-90A Foam

Cushioned-Foam Thermoplastic Polyurethane, Shore 90A base

| DOCUMENT NO.         | REVISION | ISSUE DATE | DIAMETER | NET WEIGHT |
|----------------------|----------|------------|----------|------------|
| FZ-TDS-TPU90FOAM-001 | V1.0     | 01/09/26   | 1.75 mm  | 1 kg       |

## 1 Description

Filazoo TPU-90A Foam is a foamed thermoplastic polyurethane that expands during printing to create a lightweight, cushioned texture rather than a solid fill. The foaming reduces density substantially compared with solid TPU, giving parts a soft, compressible feel with stronger cushioning than standard 95A TPU while keeping the flexibility of Shore 90A TPU.

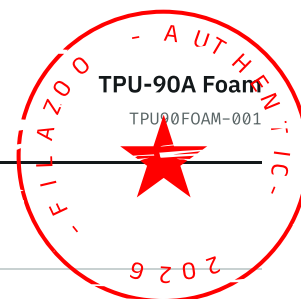
Typical applications — shoe midsoles, cushioned grips and pads, protective inserts, and parts wanting a soft, springy feel with structural support.

Processing summary — the foaming agent activates within a narrow temperature window, so hold nozzle temperature steady; a larger nozzle (0.6 mm or larger) and slower speeds give the most consistent foam cell structure. A direct-drive extruder is strongly recommended, and the filament must be kept dry.

## 2 Product Specification

Table 1 — Filament and packaging specification

| PARAMETER                                   | UNIT | VALUE                          |
|---------------------------------------------|------|--------------------------------|
| Filament diameter                           | mm   | 1.75                           |
| Diameter tolerance                          | mm   | $\pm 0.03$                     |
| Net filament weight                         | kg   | 1                              |
| Spool material                              | —    | ABS (heat resistance 70 °C)    |
| Spool dimensions ( $\varnothing \times H$ ) | mm   | $\varnothing 200 \times 67$ mm |
| Colour range                                | —    | Yellow, White                  |



### 3 Recommended Printing Parameters

Table 2 — Recommended starting parameters

| PARAMETER                     | UNIT                    | VALUE                                         |
|-------------------------------|-------------------------|-----------------------------------------------|
| Drying before printing        | °C / h                  | 70 °C for 8 – 12 h                            |
| Printing and storage humidity | —                       | Dry storage; sealed with desiccant            |
| Nozzle size                   | mm                      | ≥ 0.6 (recommended for consistent foaming)    |
| Nozzle type                   | —                       | Brass or hardened steel                       |
| Nozzle temperature            | °C                      | 215 – 235                                     |
| Build plate type              | —                       | Cool Plate, Engineering Plate or Textured PEI |
| Bed surface preparation       | —                       | Clean; light adhesive if needed               |
| Bed temperature               | °C                      | 30 – 35                                       |
| Part cooling fan              | —                       | Low to medium                                 |
| Printing speed                | mm/s                    | < 40 (outer wall ~ 25)                        |
| Enclosed chamber              | —                       | Not required                                  |
| Chamber temperature           | °C                      | 25 – 45                                       |
| Retraction length / speed     | mm / mm·s <sup>-1</sup> | 0.6 – 1.2 mm / 15 – 30 mm·s <sup>-1</sup>     |
| Max overhang angle            | °                       | ~ 40                                          |
| Max bridging length           | mm                      | ~ 8                                           |

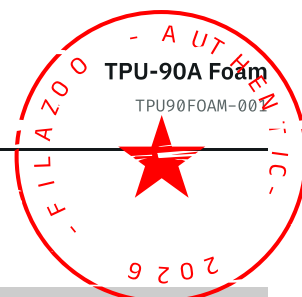
### 4 Material Properties

Values are typical results measured on standard printed specimens and are intended for design reference and comparison. They are not guaranteed minima.

#### 4.1 Physical and thermal properties

Table 3 — Physical and thermal properties

| PROPERTY                         | TEST METHOD      | UNIT              | TYPICAL VALUE                              |
|----------------------------------|------------------|-------------------|--------------------------------------------|
| Density (foamed)                 | ISO 1183         | g/cm <sup>3</sup> | ~ 0.55 – 0.70 (foamed; solid resin ~ 1.19) |
| Melt flow rate (MFR, base resin) | 210 °C, 2.16 kg  | g/10 min          | ~ 7 ± 1                                    |
| Melting temperature              | DSC              | °C                | ~ 175                                      |
| Glass transition temperature     | DSC              | °C                | ~ -35                                      |
| Vicat softening temperature      | ISO 306          | °C                | ~ 70                                       |
| Heat deflection temperature      | ISO 75, 0.45 MPa | °C                | N/A (elastomer)                            |
| Heat deflection temperature      | ISO 75, 1.8 MPa  | °C                | N/A (elastomer)                            |
| Saturated water absorption       | 25 °C, 55 % RH   | %                 | ~ 1.2 (higher than solid TPU)              |



## 4.2 Mechanical properties

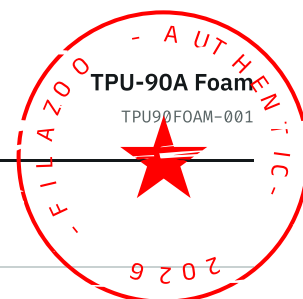
Table 4 — Mechanical properties

| PROPERTY                          | TEST METHOD | UNIT              | TYPICAL VALUE                            |
|-----------------------------------|-------------|-------------------|------------------------------------------|
| Tensile strength                  | ISO 527     | MPa               | ~ 8 ± 2                                  |
| Elongation at break               | ISO 527     | %                 | ~ 300 ± 50                               |
| Tear strength                     | ISO 34-1    | kN/m              | ~ 15 ± 4 (reduced by cellular structure) |
| Shore hardness (apparent, foamed) | ISO 868     | —                 | ~ 60A (apparent)                         |
| Compression set (23 °C, 72 h)     | ISO 815     | %                 | ~ 15 (good recovery)                     |
| Abrasion resistance (DIN)         | DIN 53516   | mm <sup>3</sup>   | ~ 90 (lower than solid TPU)              |
| Rebound resilience                | ISO 4662    | %                 | ~ 60 (high cushioning response)          |
| Flexural modulus                  | ISO 178     | MPa               | N/A (elastomer)                          |
| Impact strength, notched          | ISO 179     | kJ/m <sup>2</sup> | No break (highly flexible)               |
| Impact strength, unnotched        | ISO 179     | kJ/m <sup>2</sup> | No break (highly flexible)               |

## 4.3 Chemical and physical characteristics

Table 5 — General characteristics of TPU-90A Foam

| PARAMETER                    | VALUE                                                                        |
|------------------------------|------------------------------------------------------------------------------|
| Composition                  | Foamed thermoplastic polyurethane (TPU), Shore 90A base hardness             |
| Odour                        | Mild odour when printing                                                     |
| Skin hazard                  | No hazard in solid filament form                                             |
| Chemical stability           | Stable under normal storage and handling                                     |
| Solubility                   | Insoluble in water; open-cell structure absorbs more moisture than solid TPU |
| UV and weathering resistance | Moderate – not UV-stabilised                                                 |
| Acid resistance              | Limited resistance                                                           |
| Alkali resistance            | Limited resistance                                                           |
| Organic solvent resistance   | Resistant to many oils; limited resistance to strong solvents                |
| Oil and grease resistance    | Good resistance to oils and greases                                          |
| Flammability                 | Flammable                                                                    |
| Combustion products          | Carbon oxides, nitrogen oxides                                               |



## 5 Test Conditions

### 5.1 Specimen printing conditions

Table 6 — Conditions used to produce test specimens

| PARAMETER                         | UNIT   | VALUE                              |
|-----------------------------------|--------|------------------------------------|
| Nozzle temperature                | °C     | 225                                |
| Bed temperature                   | °C     | 32                                 |
| Printing speed                    | mm/s   | 25                                 |
| Infill density                    | %      | 100                                |
| Layer height                      | mm     | 0.2                                |
| Specimen conditioning / annealing | °C / h | 23 °C / 50 % RH for 24 h (ISO 291) |

### 5.2 Specimen geometry

Test specimens follow the geometry defined by the referenced standards. All dimensions in millimetres.

Figure 1 — Tensile specimen

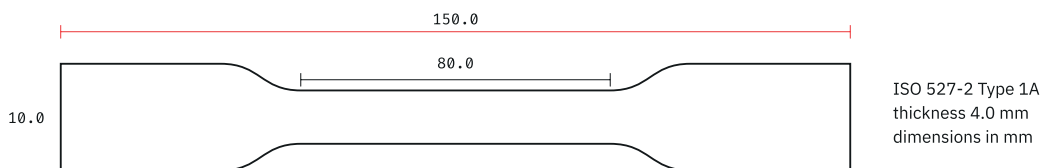


Figure 2 — Flexural specimen

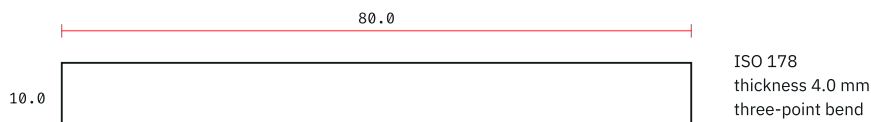
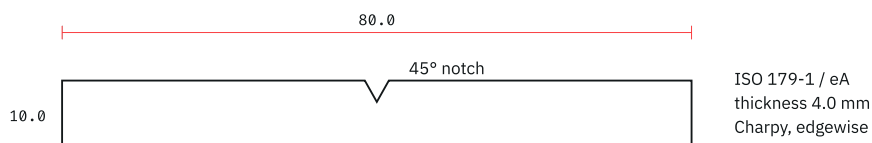


Figure 3 — Impact specimen



## 6 Disclaimer

The performance values in this document are typical values obtained from standard printed specimens. They are provided for design reference and comparison only and do not constitute a specification or a warranty of performance. Actual printed part performance depends on many further factors, including the printer, hotend and nozzle, slicer settings, part geometry, wall count and infill, build orientation, and ambient conditions.

Users are responsible for the legality, safety and suitability of anything they print. Filazoo accepts no responsibility for the use of its materials in any particular application, or for any damage arising in the course of using them.