# Raise3D Industrial PA12 CF Technical Data Sheet

Raise3D Industrial PA12 CF Filament is a carbon fiber reinforced composite filament material based on Nylon 12 (Polyamide 12). Thanks to the reinforcement of short carbon fibers, it exhibits excellent rigidity and strength, heat resistance, low warpage, and low water absorption. Meanwhile, this material has outstanding strength to weight ratio, which makes it suitable to replace metal in the manufacturing of certain lightweight components.

## Filament Specifications

| Property | Testing Method | Typical Value |
|---|---|---|
| Density ($g/cm^3$ at 21.5 °C) | ASTM D792<br>(ISO 1183, GB/T 1033) | 1.06 |
| Heat Deflection Temperature (°C) | ISO75 1.8MPa<br>ISO75 0.45 MPa | 105<br>131 |
| Melt index (g/10 min) | 280 °C, 2.16 kg | 25 |
| Moisture content (%) | Thermogravimetric | ≤ 0.6% |
| Odor | / | Almost odorless |
| Solubility | / | Insoluble in water |

## Mechanical Properties (Dry state)

| Property | Testing Method | Typical value |
|---|---|---|
| Young's modulus (X-Y) | ISO 527, GB/T 1040 | 3320 ± 145 MPa |
| Young's modulus (Z) | / | 1830 ± 80 MPa |
| Tensile strength (X-Y) | ISO 527, GB/T 1040 | 72 ± 2 MPa |
| Tensile strength (Z) | / | 43 ± 3 MPa |
| Elongation at break (X-Y) | ISO 527, GB/T 1040 | 3.6 ± 0.3 % |
| Elongation at break (Z) | / | 3.3 ± 0.5% |

*All specimens were annealed at 80˚C for 24h and dried for 48h prior to testing.*

**Mechanical Properties (Conditioned)**

| Property | Testing Method | Typical value |
|---|---|---|
| Young's modulus (X-Y) | ISO 527, GB/T 1040 | 3040 ± 130 MPa |
| Young's modulus (Z) | / | 1530 ± 70 MPa |
| Tensile strength (X-Y) | ISO 527, GB/T 1040 | 73 ± 1 MPa |
| Tensile strength (Z) | / | 42 ± 2 MPa |
| Elongation at break (X-Y) | ISO 527, GB/T 1040 | 6.1 ± 0.6 % |
| Elongation at break (Z) | / | 3.5 ± 0.5% |
| Bending modulus (X-Y) | ISO 178, GB/T 9341 | 3336 ± 292 MPa |
| Bending strength (X-Y) | ISO 178, GB/T 9341 | 100 ± 4 MPa |
| Charpy impact strength (X-Y) | ISO 179, GB/T 1043 | 9.2 ± 0.6 kJ/m$^2$ |

*All specimens were annealed at 80 °C for 24h, and immerged in ambient temperature for 3 days prior to testing.*

**Note:**

1. Dry PA12 CF at 80°C for 12 hours before printing, moisture content is crucial for final printed part quality.
2. After drying, we recommend to store PA12 CF filament into Raise3D Filament Dry Box during the printing.
3. Abrasion of the brass nozzle happens frequently when printing PA12 CF. Using abrasion resistance nozzle, such as hardened steel and ruby nozzle, is highly recommended.
4. After printing, it is recommended to anneal the model in the oven at 80°C for 6-8 hours.
5. After annealing, max. 1.0 % dimensional shrinkage could be observed in Z-axis depending on infill and layer height, no obvious dimensional shrinkage in XY-axis.
6. If PA12 CF is used as the support material for itself, please remove the support structure after annealing. Otherwise, the support structure could be permanently bonded to the model after moisture absorption.

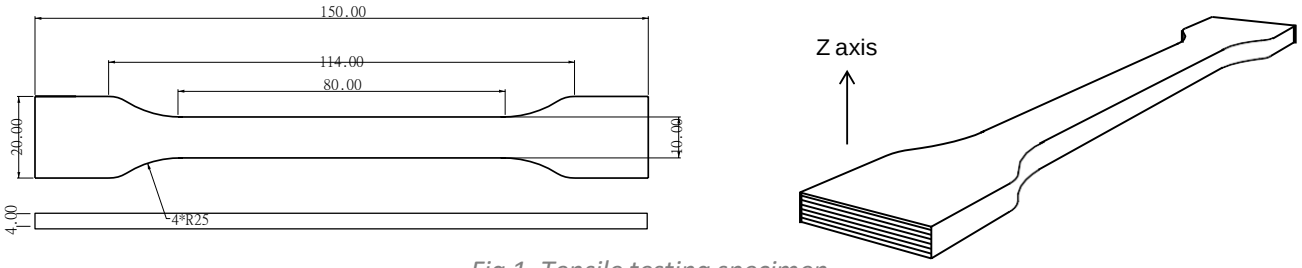


*Fig 1. Tensile testing specimen*

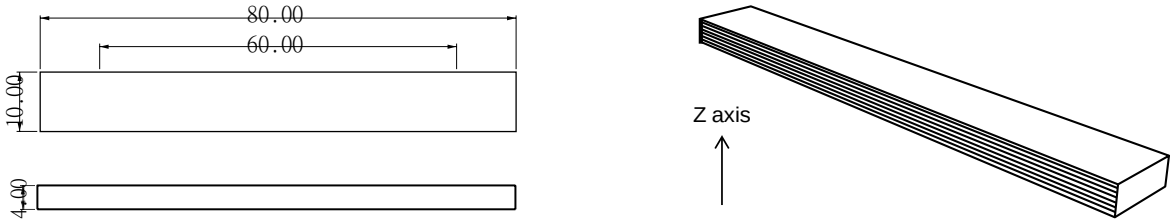


*Fig 2. Flexural testing specimen*

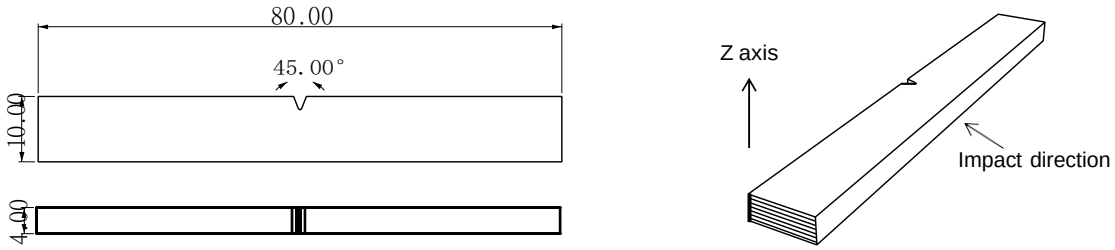


*Fig 3. Impact testing specimen*

## Disclaimer

The typical values presented in this data sheet are intended for reference and comparison purposes only. They should not be used for design specifications or quality control purposes. Actual values may vary significantly with printing conditions. End-use performance of printed parts depends not only on materials, but also on part design, environmental conditions, printing conditions, etc. Product specifications are subject to change without notice.

Each user is responsible for determining the safety, lawfulness, technical suitability, and disposal/recycling practices of Raise3D materials for the intended application. Raise3D makes no warranty of any kind, unless announced separately, to the fitness for any particular use or application. Raise3D shall not be made liable for any damage, injury or loss induced from the use of Raise3D materials in any particular application.