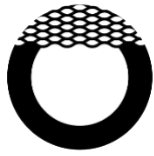


## Technical Data Sheet

# PolyMide™ PA12-CF

[www.polymaker.com](http://www.polymaker.com)

V5.4



PolyMide™

PA12-CF

PolyMide™ PA12-CF is a carbon fiber reinforced long chain copolyimide filament. Thanks to its chemical structure, this product has lower moisture sensitivity compared to PA6/66 and PA6-based materials, and better mechanical properties than PA12-based materials. In addition, the carbon fiber reinforcement and Warp-free™ technology enhance the size stability of the prints produced with this material.

### PHYSICAL PROPERTIES

Property	Testing Method	Typical Value
Density	ISO1183, GB/T1033	1.06 g/cm <sup>3</sup> at 23°C
Melt index	280°C, 2.16 kg	25 g/10min

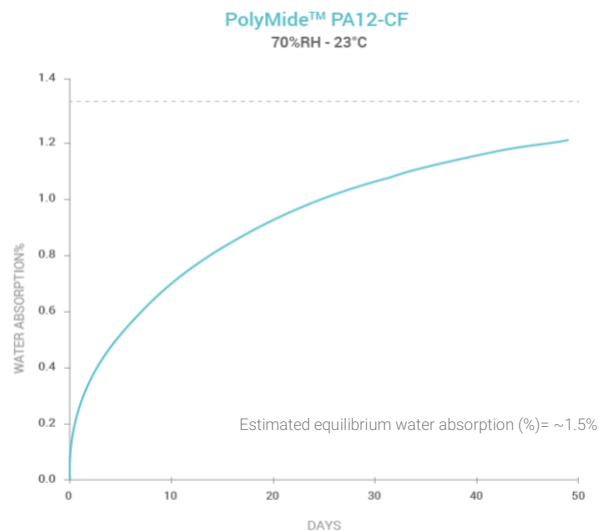
### CHEMICAL RESISTANCE DATA

Property	Typical Value
Effect of weak acids	Poor
Effect of strong acids	Poor
Effect of weak alkalis	Fair
Effect of strong alkalis	Poor
Effect of oils and grease	Good

**Note:**

- Good: Material may get minor attack after long periods of storage with chemical at ambient temperature
- Fair: Material can be used for short time contact with chemical at ambient temperature
- Poor: Material becomes unstable on contact with chemical at ambient temperature

### MOISTURE ABSORPTION CURVE



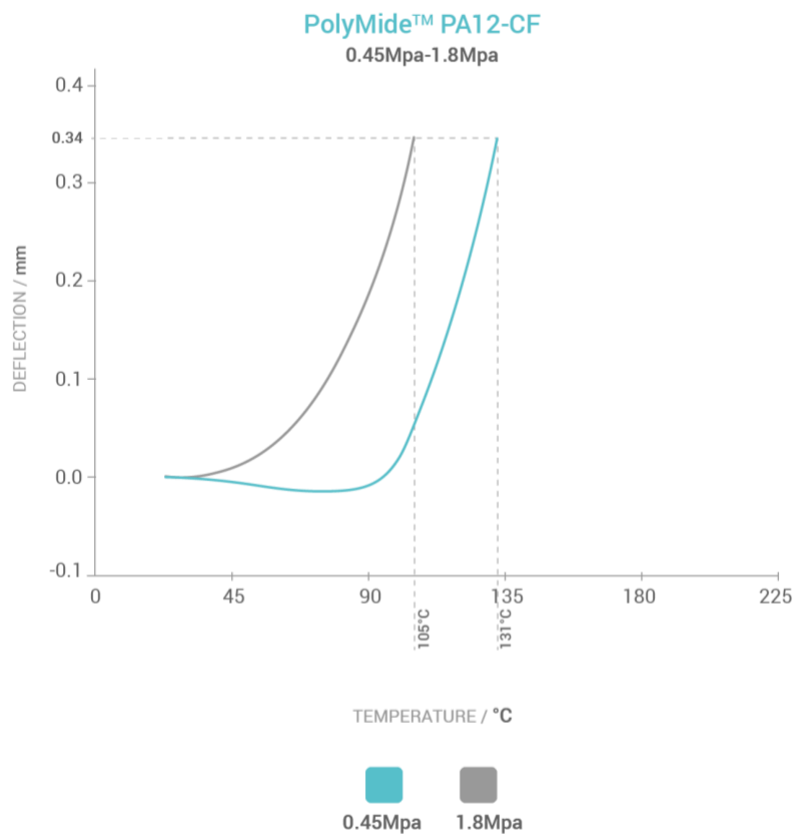
**Note:**

PolyMide™ PA12-CF absorbs moisture slowly over the time. The estimated equilibrium water absorption is around 1.5%.

## THERMAL PROPERTIES

Property	Testing Method	Typical Value
Glass transition temperature	DSC, 10°C/min	55°C
Melting temperature	DSC, 10°C/min	171°C
Crystallization temperature	DSC, 10°C/min	120°C
Decomposition temperature	TGA, 20°C/min	N/A
Vicat softening temperature	ISO 306, GB/T 1633	N/A
Heat deflection temperature	ISO 75 1.8MPa	105°C
Heat deflection temperature	ISO 75 0.45MPa	131°C

## HDT CURVE



## MECHANICAL PROPERTIES (Dry Status)

Property	Testing Method	Typical Value
Young's modulus (X-Y)	ISO 527, GB/T 1040	3311 ± 135 MPa
Young's modulus (Z)		1807 ± 146 MPa
Tensile strength (X-Y)	ISO 527, GB/T 1040	77.4 ± 1.1 MPa
Tensile strength (Z)		52.2 ± 0.8 MPa
Elongation at break (X-Y)	ISO 527, GB/T 1040	4.2 ± 0.4 %
Elongation at break (Z)		5.0 ± 1.0 %
Bending modulus (X-Y)	ISO 178, GB/T 9341	2887 ± 145 MPa
Bending modulus (Z)		N/A
Bending strength (X-Y)	ISO 178, GB/T 9341	112.4 ± 1.0 MPa
Bending strength (Z)		N/A
Notched Charpy impact strength (X-Y)	ISO 179, GB/T 1043	9.9 ± 0.7 kJ/m <sup>2</sup>
Notched Charpy impact strength (Z)		N/A

\*All specimens were annealed at 80°C for 6h and dried for 48h prior to testing

## MECHANICAL PROPERTIES (Wet Status)

Property	Testing Method	Typical Value
Young's modulus (X-Y)	ISO 527, GB/T 1040	3132 ± 124 MPa
Young's modulus (Z)		1622 ± 72 MPa
Tensile strength (X-Y)	ISO 527, GB/T 1040	71.7 ± 0.7 MPa
Tensile strength (Z)		42.1 ± 1.8 MPa
Elongation at break (X-Y)	ISO 527, GB/T 1040	5.3 ± 0.3 %
Elongation at break (Z)		5.3 ± 1.2 %
Bending modulus (X-Y)	ISO 178, GB/T 9341	2653 ± 57 MPa
Bending modulus (Z)		N/A
Bending strength (X-Y)	ISO 178, GB/T 9341	91.8 ± 1.5 MPa
Bending strength (Z)		N/A
Notched Charpy impact strength (X-Y)	ISO 179, GB/T 1043	10.2 ± 0.8 kJ/m <sup>2</sup>
Notched Charpy impact strength (Z)		N/A

\*All specimens were annealed at 80°C for 6h, and immersed in water at 60°C for 48h prior to testing. The average moisture content of specimens is 2.92%

## RECOMMENDED PRINTING CONDITIONS

Parameter	
Nozzle temperature	260 – 300 (°C)
Build surface treatment	PC and Texture PEI (Glue when needed)
Build plate temperature	25 - 50 (°C)
Cooling fan	OFF
Printing speed	50 - 300 (mm/s)
Retraction distance	3 - 6 (mm)
Retraction speed	40 - 60 (mm/s)
Closure Chamber	Needed (ambient temperature)
Recommended support material	PolySupport™ for PA12
Drying setting	100°C for 8h
Annealing setting	80°C for 6 h

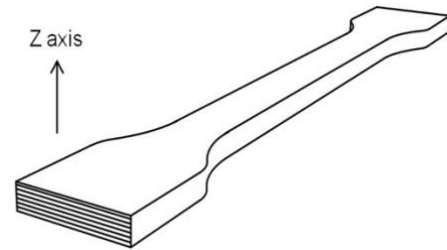
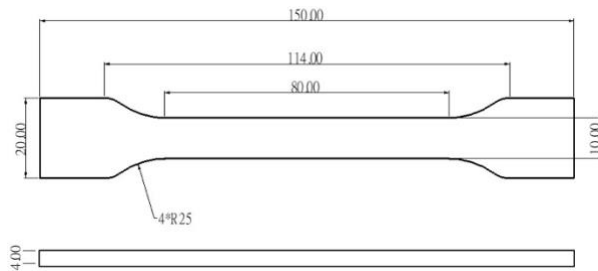
\* Based on 0.4 mm nozzle. Printing conditions may vary with different nozzle diameters

### Note:

- Abrasion of the brass nozzle happens frequently when printing PolyMide™ PA12-CF. Normally, the life of a brass nozzle would be approximately 9h. A wear-resistance nozzle, such as hardened steel and ruby nozzle, is highly recommended to be used with PolyMide™ PA12-CF.
- If PolyMide™ PA12-CF is used as the support material for itself, please remove the support structure before excessive moisture absorption. Otherwise, the support structure can be permanently bonded to the model.
- After the printing process, it is recommended to anneal the model in the oven at 80°C for 6 hours.

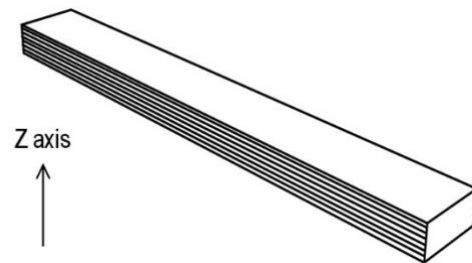
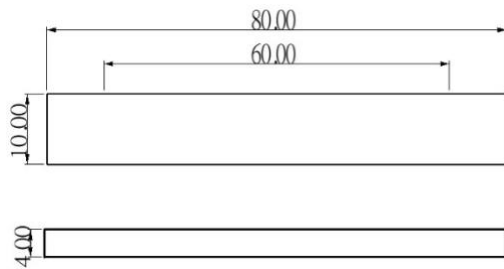
## TENSILE TESTING SPECIMEN

ISO 527, GB/T 1040



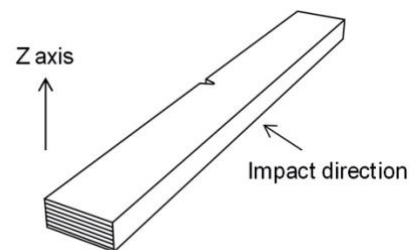
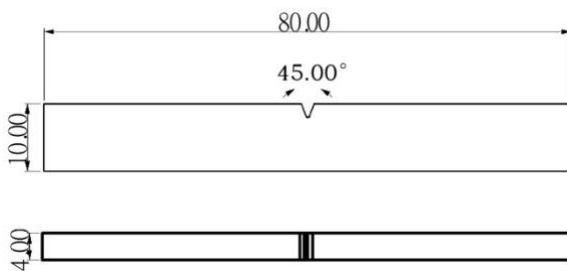
## FLEXURAL TESTING SPECIMEN

ISO 178, GB/T 9341



## IMPACT TESTING SPECIMEN

ISO 179, GB/T 1043



## HOW TO MAKE SPECIMENS

Printing temperature	290 °C
Bed temperature	50 °C
Shell	2
Top & bottom layer	3
Infill	100%
Environmental temperature	Ambient temperature
Cooling fan	OFF

**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 Polymaker materials for the intended application. Polymaker makes no warranty of any kind, unless announced separately, to the fitness for any use or application. Polymaker shall not be made liable for any damage, injury or loss induced from the use of Polymaker materials in any application.