

Innovators in 3D printing



Technical Data Sheet

# PolyMax<sup>™</sup> PC-FR

www.polymaker.com



PolyMax<sup>™</sup> PC-FR, creation from Covestro's Makrolon® family, could achieve V0 performance in the UL94 flame retardancy test and displays excellent toughness, strength and heat resistance. This filament opens new applications in the automotive, railway and aerospace industries.

#### PHYSICAL PROPERTIES

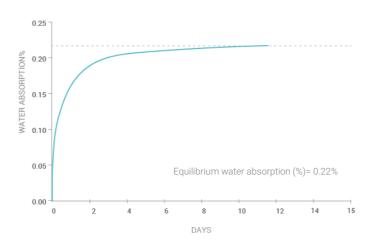
Property	Testing Method	Typical Value
Density	ISO1183, GB/T1033	1.2 g/cm <sup>3</sup> at 23°C
Melt index	260°C, 5 kg	12-17 g/10min
Light transmission	N/A	N/A
Flame retardancy	UL94	VO

## CHEMICAL RESISTANCE DATA

Property	Testing Method
Effect of weak acids	Slight resistant
Effect of strong acids	Not resistant
Effect of weak alkalis	Slight resistant
Effect of strong alkalis	Not resistant
Effect of organic solvent	Not resistant
Effect of oils and grease	No data available

## MOISTURE ABSORPTION CURVE

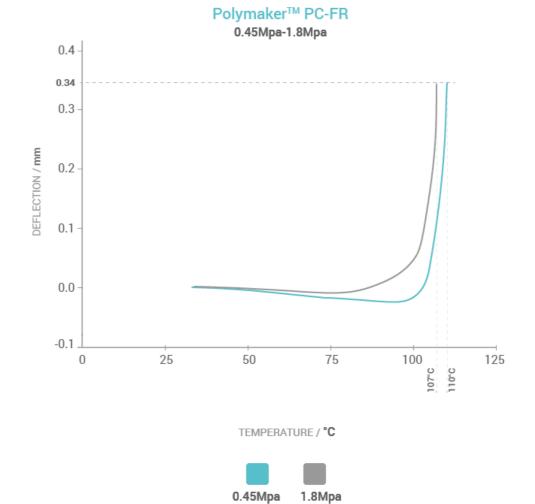
PolyMax<sup>™</sup> PC-FR 70%RH - 23°C



## THERMAL PROPERTIES

Property	Testing Method	Typical Value
Glass transition temperature	DSC, 10°C/min	115 °C
Melting temperature	DSC, 10°C/min	N/A
Crystallization temperature	DSC, 10°C/min	N/A
Decomposition temperature	TGA, 20°C/min	N/A
Vicat softening temperature	ISO 306 GB/T 1633	116 °C
Heat deflection temperature	ISO 75 1.8MPa	107 °C
Heat deflection temperature	ISO 75 0.45MPa	110 °C
Thermal conductivity	N/A	N/A
Heat shrinkage rate	N/A	N/A

#### HDT CURVE



## MECHANICAL PROPERTIES

Property	Testing Method	Typical Value
Young's modulus (X-Y)		2634 ± 182 MPa
Young's modulus (Z)	ISO 527, GB/T 1040	2743 ± 72 MPa
Tensile strength (X-Y)		67 ± 4.5 MPa
Tensile strength (Z)	ISO 527, GB/T 1040	46 ± 4.8 MPa
Elongation at break (X-Y)	100 E07 CD/T 1040	3.49 ± 0.7 %
Elongation at break (Z)	ISO 527, GB/T 1040	2.2 ± 0.3 %
Bending modulus (X-Y)		2518 ± 53 MPa
Bending modulus (Z)	ISO 178, GB/T 9341	N/A
Bending strength (X-Y)		96.6 ± 1.3 MPa
Bending strength (Z)	ISO 178, GB/T 9341	N/A
Charpy impact strength (X-Y)	100 170 OD/T 1040	11.7 ± 1.6 kJ/m <sup>2</sup>
Charpy impact strength (Z)	ISO 179, GB/T 1043	N/A
Low temperature impact	ISO 179-1/1eA:2010,	7.5 ± 1.6 kJ/m <sup>2</sup>
strength (X-Y)	-30°C	

#### **RECOMMENDED PRINTING CONDITIONS**

\* Based on 0.4 mm nozzle and Simplify 3D v.4.0. Printing conditions may vary with different nozzle diameters

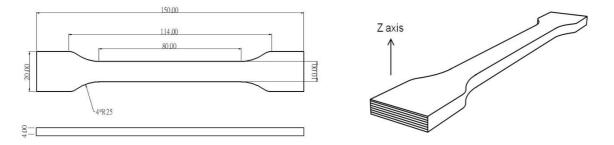
Parameter	
Nozzle temperature	250 − 270 (°C)
Build surface material	Any surface
Build surface treatment	PVA glue or MAGIGOO PC
Build plate temperature	90 - 105 (°C)
Cooling fan	OFF
Printing speed	30-50 (mm/s)
Raft separation distance	0.2 (mm)
Retraction distance	1 (mm)
Retraction speed	20 (mm/s)
Environmental temperature	90-100 (°C)
Threshold overhang angle	45 (°)
Recommended support material	PolyDissolve™ S2

#### Note:

- When printing with PolyMax<sup>™</sup> PC-FR, it is recommended to use an enclosure. For large part, it is recommended to use a heated chamber.
- It is recommended to anneal the printed part right after the printing process to release the residual internal stress. Annealing settings: 90°C for 2h

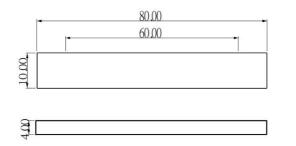
#### TENSILE TESTING SPECIMEN

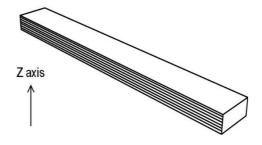
ISO 527, GB/T 1040



FLEXURAL TESTING SPECIMEN

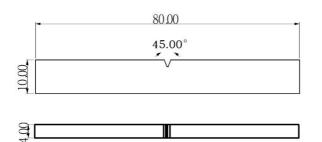
ISO 178, GB/T 9341

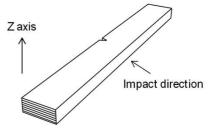




**IMPACT TESTING SPECIMEN** 

ISO 179, GB/T 1043





#### HOW TO MAKE SPECIMENS

Printing temperature	270 °C
Bed temperature	105 °C
Shell	2
Top & bottom layer	4
Infill	100%
Environmental temperature	90°C
Cooling fan	OFF

\*All specimens were conditioned at room temperature for 24h prior to testing

#### **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.

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