

## PolyCore ASA-3012

### Technical Data Sheet (Ver. 2.0, last updated: Dec, 2023)

PolyCore™ ASA-3012 is reinforced with 20% glass fiber, featuring with excellent weather resistance and UV stability as well as strong mechanical properties. ASA-3012 is known for its ability to withstand harsh outdoor environments, making it a popular choice for outdoor applications such as bridge, horticulture and landscape.

#### Basic Properties

Property	Testing Method	Typical Value
Density (g/cm <sup>3</sup> at 21.5 °C)	ASTM D792 (ISO 1183, GB/T 1033)	1.2
Melt index (g/10 min)	220 °C, 10 kg	6 - 10
Glass transition temperature (°C)	DSC, 10 °C/min	98
Vicat Softening temperature (°C)	ASTM D1525 (ISO 306 GB/T 1633)	105
Heat Deflection Temperature (°C)	ISO 75 1.8MPa 0.45MPa	97 104

#### Mechanical Properties1

Property	Testing Method	Typical Value
Young's modulus (MPa)	ASTM D638 (ISO 527, GB/T 1040)	7237 ± 136
Tensile strength (MPa)	ASTM D638 (ISO527, GB/T 1040)	101.3 ± 2.4
Elongation at break (%)	ASTM D638 (ISO527, GB/T 1040)	2.6 ± 0.3
Bending modulus (MPa)	ASTM D790 (ISO 178, GB/T 9341)	7094 ± 89
Bending strength (MPa)	ASTM D790 (ISO 178, GB/T 9341)	149.6 ± 2.1

1. Tested with injection molding specimens

#### Mechanical Properties1

Property	Testing Method	Typical Value
Young's modulus (MPa) (X-Y)	ASTM D638 (ISO 527, GB/T 1040)	5394 ± 441
Tensile strength (MPa) (X-Y)	ASTM D638 (ISO527, GB/T 1040)	55.9 ± 4.2
Elongation at break (%) (X-Y)	ASTM D638 (ISO527, GB/T 1040)	1.4 ± 0.2
Bending modulus (MPa) (X-Y)	ASTM D790 (ISO 178, GB/T 9341)	4976 ± 70

Bending strength (MPa) (X-Y)	ASTM D790 (ISO 178, GB/T 9341)	64.6 ± 2.4
Charpy Impact strength (kJ/m <sup>2</sup> ) (X-Y)	ASTM D256 (ISO 179, GB/T 1043)	36.8 ± 1.3
Young's modulus (MPa) (Z)	ASTM D638 (ISO 527, GB/T 1040)	2649 ± 310
Tensile strength (MPa) (Z)	ASTM D638 (ISO527, GB/T 1040)	25.9 ± 1.6
Elongation at break (%) (Z)	ASTM D638 (ISO527, GB/T 1040)	1.5 ± 0.2
Bending modulus (MPa) (Z)	ASTM D790 (ISO 178, GB/T 9341)	2720 ± 212
Bending strength (MPa) (Z)	ASTM D790 (ISO 178, GB/T 9341)	26.1 ± 1.2
Charpy Impact strength (kJ/m <sup>2</sup> ) (Z)	ASTM D256 (ISO 179, GB/T 1043)	25.3 ± 2.8

1. Tested with the specimens printed under following conditions:  
 Nozzle temperature = 240°C, Nozzle diameter: 8mm, Shell width = 14mm, Layer height = 3mm, Layer time = 55s,  
 Room temperature = 15°C, 100% solid specimens.

## Recommended Printing Conditions

Parameter	Recommended Setting
Drying temperature (°C)	80
Drying Time (h)	4
Maximum moisture content (%)	0.1
Barrel – zone 1 temperature (°C)	200 - 220
Barrel – zone 2 temperature (°C)	230 - 250
Barrel – zone 3 temperature (°C)	220 - 240
Nozzle temperature (°C)	210 - 230
Bed temperature (°C)	40 - 80
Other Comments	
<ul style="list-style-type: none"> <li>● It is recommended to stop feeding and continue extruding until the extruder is fully empty, if the printing stops in a short term, such as 10-30 min.</li> <li>● It is recommended to stop feeding and continue extruding until the extruder is fully empty, then use polyethylene (PE) to clean the extruder, if the printing stop in a long term, such as several hours. It is helpful to avoid the carbonization of material and keep extruder working in a good condition</li> </ul>	

## Recommended Printing Parameters

	Tr = 40°C Width=22mm Height=3mm	Tr = 40°C Width=16mm Height=3mm	Tr = 40°C Width=5mm Height=2mm	Tr = 25°C Width=22mm Height=3mm	Tr = 25°C Width=16mm Height=3mm	Tr = 25°C Width=5mm Height=2mm	Tr = 10°C Width=22mm Height=3mm	Tr = 10°C Width=16mm Height=3mm	Tr = 10°C Width=5mm Height=2mm
Top layer Temperature	Layer Time (s)	Layer Time (s)	Layer Time (s)	Layer Time (s)	Layer Time (s)	Layer Time (s)	Layer Time (s)	Layer Time (s)	Layer Time (s)
180 °C	47	45	31	41	39	25	36	33	20
170 °C	59	56	41	51	49	33	45	41	26
160 °C	74	71	53	64	61	43	55	52	34
150 °C	93	89	70	80	76	56	69	65	45
140 °C	118	112	93	100	95	74	86	81	59
130 °C	148	142	122	125	120	98	108	101	77
120 °C	187	179	161	157	150	128	134	126	101
110 °C	235	225	212	197	188	168	168	158	132
100 °C	296	284	278	246	235	222	209	198	174
90 °C	373	358	357	308	295	292	261	248	228

### 1: Definition of each concept

- Layer time: the time spent for depositing one layer of the printed part.
- Top layer temperature: the instantaneous temperature of a specific point on the topmost completed layer, measured when the nozzle printing the current layer is positioned directly above it.
- Width: the cross-sectional dimension of the printed layer, perpendicular to the direction of the print nozzle's movement.
- Height: the vertical dimension of the printed object, or the layer thickness during pellet printing.
- Tr: room temperature when starting pellet printing.

2: The top layer temperature should range between the material's glass transition temperature ( $T_g$ ) and its non-collapse printing temperature for optimal mechanical properties and dimensional stability.

3: Above data is inferred based on a melt temperature of 230°C at nozzle exit and a 1m\*1m\*1m square frame model.

4: The simulation condition is based on a closed room without additional air disturbances, and assumes some environment temperature increment.

5: Above data is inferred based on the thermal history simulation software, Dragon, by Helio Additive. It should be used for reference only. For a more detailed analysis, please contact Polymaker.

## 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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