PolyCore ABS-5012

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

PolyCore™ ABS-5012 is 20% glass fiber reinforced ABS pellet featured with great cost effectiveness, excellent printability, balanced mechanical properties and broad applicability. This product can be applied to a wide range of scenarios including but not limited to: low-to-medium temperature tooling, architecture template such as concrete mold, general prototyping, etc.

Basic Properties

Property	Testing Method	Typical Value
Density (g/cm^3 at 21.5 °C)	ASTM D792 (ISO 1183, GB/T 1033)	1.21
Melt index (g/10 min)	? °C, ? kg	12.7
Glass transition temperature (°C)	DSC, 10 °C/min	96
Vicat Softening temperature (°C)	ASTM D1525 (ISO 306 GB/T 1633)	109
Heat Deflection Temperature (°C)	ISO 75 1.8MPa 0.45MPa	96 102

Mechanical Properties1

Property	Testing Method	Typical Value
Young's modulus (MPa)	ASTM D638 (ISO 527, GB/T 1040)	7343 ± 158
Tensile strength (MPa)	ASTM D638 (ISO527, GB/T 1040)	90.6 ± 0.9
Elongation at break (%)	ASTM D638 (ISO527, GB/T 1040)	2.3 ± 0.1
Bending modulus (MPa)	ASTM D790 (ISO 178, GB/T 9341)	6328 ± 317
Bending strength (MPa)	ASTM D790 (ISO 178, GB/T 9341)	119.3 ± 2.7

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)	3994±159
Tensile strength (MPa) (X-Y)	ASTM D638 (ISO527, GB/T 1040)	74.6±3.8
Elongation at break (%) (X-Y)	ASTM D638 (ISO527, GB/T 1040)	9.7±0.7
Bending modulus (MPa) (X-Y)	ASTM D790 (ISO 178, GB/T 9341)	5410±519

Bending strength (MPa) (X-Y)	ASTM D790 (ISO 178, GB/T 9341)	107.2±4.4
Charpy Impact strength (kJ/m^2) (X-Y) -	ASTM D256 (ISO 179, GB/T 1043)	9.9±1.6
Young's modulus (MPa) (Z)	ASTM D638 (ISO 527, GB/T 1040)	1943.2±51.6
Tensile strength (MPa) (Z)	ASTM D638 (ISO527, GB/T 1040)	23.5±0.7
Elongation at break (%) (Z)	ASTM D638 (ISO527, GB/T 1040)	5.9±1
Bending modulus (MPa) (Z)	ASTM D790 (ISO 178, GB/T 9341)	2398±147.5
Bending strength (MPa) (Z)	ASTM D790 (ISO 178, GB/T 9341)	39.2±2.3
Charpy Impact strength (kJ/m^2) (Z) -	ASTM D256 (ISO 179, GB/T 1043)	6.4±0.1

1. Tested with the specimens printed under following conditions: Nozzle temperature = 265 °C, printing speed = 13.5kg/h, Nozzle diameter: 8mm, Shell width = 13mm, Layer height = 3mm, Layer time = 60s, Room temperature =28°C ,100% solid specimens.

Recommended Printing Conditions

Parameter	Recommended Setting
Drying temperature (°C)	80
Drying Time (h)	3-4
Maximum moisture content (%)	0.02
Barrel – zone 1 temperature (°C)	210 - 230
Barrel – zone 2 temperature (°C)	220 - 240
Barrel – zone 3 temperature (°C)	230 - 250
Nozzle temperature (°C)	230 - 250
Bed temperature (°C)	40 - 80

Other Comments

- 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.
- 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

Recommended Printing Parameters

	Tr = 40℃ Width=22mm Height=3mm	Tr = 40℃ Width=16mm Height=3mm	Tr = 40℃ Width=5mm Height=2mm	Tr = 25℃ Width=22mm Height=3mm	Tr = 25℃ Width=16mm Height=3mm	Tr = 25℃ Width=5mm Height=2mm	Tr = 10℃ Width=22mm Height=3mm	Tr = 10℃ Width=16mm Height=3mm	Tr = 10℃ 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 ℃	50	47	17	45	41	14	39	35	12
170 ℃	64	58	22	56	50	18	48	43	15
160 ℃	80	70	27	69	60	23	60	52	18
150 ℃	100	86	34	86	73	28	73	62	23
140 ℃	125	105	44	107	88	35	91	76	29
130 ℃	157	128	54	133	107	44	112	92	36
120 ℃	196	156	67	162	129	55	138	111	45
110 ℃	245	190	83	200	157	68	165	134	56
100 ℃	307	232	104	254	190	85	204	162	69
90 ℃	384	283	130	316	230	106	257	197	87

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 (Tg) and its non-collapse printing temperature for optimal mechanical properties and dimensional stability.

3：Above data is inferred based on a melt temperature of 245°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 increasement.

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.

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 particular use or application. Playmaker shall not be made liable for any damage, injury or loss induced from the use of Polymaker materials in any particular application.