TECHNICAL DATA

ASA+GF

Product Demonstration

Kings 3D Printing

Material Overview

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

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Kings 3D Printing

Basic Properties

Property	Testing Method	Typical Value
Density (g/cm³ at 21.5 ℃)	ASTM D792 (ISO 1183, GB/T 1033)	1.2
Melt index (g/10 min)	220 ℃,10 kg	6-10
Glass transition temperature(℃)	DSC,10℃/min	98
Vicat Softening temperature (℃)	ASTM D1525 (ISO 306 GB/T 1633)	105
Heat Deflection Temperature (℃)	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

*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/m²)(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/m²)(Z)	ASTM D256 (ISO 179,GB/T 1043)	25.3 + 2.8

*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 (℃)	80
Drying Time (h)	4
Maximum moisture content(%	0.1
Barrel- zone 1 temperature(℃)	200-220
Barrel- zone 2 temperature	230-250
Barrel- zone 3 temperature(℃)	220-240
Nozzle temperature (℃)	210-230
Bed temperature (℃)	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 Kings (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 Tempera a ture	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 ℃	47	45	31	41	39	25	36	33	20
170 ℃	59	56	41	51	49	33	45	41	26
160 ℃	74	71	53	64	61	43	55	52	34
150 ℃	93	89	70	80	76	56	69	65	45
140 ℃	118	112	93	100	95	74	86	81	59
130 ℃	148	142	122	125	120	98	108	101	77
120 ℃	187	179	161	157	150	128	134	126	101
110 ℃	235	225	212	197	188	168	168	158	132
100 ℃	296	284	2778	246	235	222	209	198	174
90 ℃	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 (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 230℃ 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 Kings.

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