



## MINGDA Technical Parameters of High-performance Printing Filaments

Filament Type		Consumer Filament			Entry-level Engineering Filaments			Middle-Level Engineering Filament					High-Level Engineering Filament		
Filament		PETG	ABS	ASA	HtPA	PET-GF		PET-CF		PA12-CF		HtPA-GF		HtPA-CF	
Printing Tips		±45°filling angle, 100% filling; Nozzle temperature: 250°C, Bed temperature: 100°C			±45°filling angle, 100% filling; Nozzle temperature: 320°C, Bed temperature: 80°C; No requirement for insulation chamber										
Annealing						Unannealed	After annealing at 100°C	Unannealed	After annealing at 100°C	Unannealed	After annealing at 100°C	Unannealed	After annealing at 100°C	Unannealed	After annealing at 100°C
Density		1.24 g/cm <sup>3</sup>	1.05 g/cm <sup>3</sup>	1.10 g/cm <sup>3</sup>	1.21 g/cm <sup>3</sup>	1.35 g/cm <sup>3</sup>		1.3 g/cm <sup>3</sup>		1.09 g/cm <sup>3</sup>		1.26 g/cm <sup>3</sup>		1.15 g/cm <sup>3</sup>	
Thermal Performance	HDT 0.45MPa	72 °C	92°C	96°C	84°C	75.9°C	120.3°C	81.6°C	148.8°C	67°C	124.6°C	77.9°C	147.7°C	81.3°C	172.1°C
	HDT 1.80MPa	68 °C	86°C	90°C	79°C	71.9°C	99.1°C	75.3°C	112.1°C	54.4°C	102°C	74.8°C	104.6°C	75.9°C	113.7°C
X-Y Mechanical Properties	Tensile Strength	31±0.5 Mpa	41.65±0.27 Mpa	38.5±1.6 Mpa	86.30±0.79 Mpa	64.65±3.12 Mpa	70.86±2.86 Mpa	82.2 ±2.12 Mpa	87.41±3.57 Mpa	56.32 ±0.28 Mpa	65.53±0.98 Mpa	76.70 ±0.81 Mpa	75.91±4.61 Mpa	85.96 ±0.85 Mpa	91.60±2.17Mpa
	Tensile Modulus	1550±108 MPa	2351±92 MPa	2317±246 MPa	3172.39 ±71.95 Mpa	4011.36 ±292.39 Mpa	4130.13±107.00 Mpa	5607.59 ±281.69 Mpa	6025.53 ±355.46 Mpa	2869.58 ±27.14 Mpa	3317.69 ±55.41 Mpa	4327.24 ±208.27 Mpa	5151.31 ±400.74 Mpa	6640.92 ±186.59 Mpa	7178.17 ±207.15 Mpa
	Elongation at Break	5.1±0.2 %	2.21±0.08 %	2.38±0.23 %	7.08±0.97 %	2.53±0.38 %	2.56±0.30 %	3.30 ±0.15 %	1.99±0.18 %	5.32±0.16 %	3.33±0.17 %	2.80±0.13%	1.91±0.14%	1.97±0.05%	1.58±0.07 %
	Bending Strength	51.8±1.5 Mpa	63.3±0.69 Mpa	64.49±1.3 Mpa	133.35±1.20 MPa	98.62±0.84 Mpa	114.87±3.00 Mpa	128.44 ±3.12 Mpa	122.69±5.19 Mpa	82.73 ±1.43 Mpa	103.13 ±1.46 Mpa	122.89 ±1.34 Mpa	114.26±7.97 Mpa	141.41 ±1.68 Mpa	138.94±3.09 Mpa
	Flexural Modulus	1990±89 Mpa	2359±233 Mpa	2399±147 Mpa	3512.73 ±153.72 Mpa	3201.00 ±57.42 Mpa	3650.32±65.81 Mpa	4892.93 ±130.81 Mpa	6025.53 ±355.46 Mpa	2815.04 ±66.04 Mpa	3340.154 ±259.26 Mpa	4038.02 ±107.37 Mpa	4340.48 ±58.00 MPa	6612.34 ±424.83 Mpa	6688.76 ±109.11 Mpa
Notched Impact Strength	4.5±0.9 KJ/m <sup>2</sup>	19.15±0.61 KJ/m <sup>2</sup>	12.9±0.9 KJ/m <sup>2</sup>	5.14±0.21 KJ/m <sup>2</sup>	12.68±1.61 KJ/m <sup>2</sup>	6.56±0.68 KJ/m <sup>2</sup>	9.32 ±1.22 KJ/m <sup>2</sup>	5.57±0.58 KJ/m <sup>2</sup>	13.75 ±0.77 KJ/m <sup>2</sup>	9.58±0.70 KJ/m <sup>2</sup>	10.38 ±0.90 KJ/m <sup>2</sup>	5.62±0.62 KJ/m <sup>2</sup>	10.47 ±0.50 KJ/m <sup>2</sup>	5.34±0.68 KJ/m <sup>2</sup>	
Z Mechanical Properties	Tensile Strength	28.9±0.6 Mpa	20.4±1.32 Mpa	27.87±0.4 Mpa	62.63±1.02 Mpa	25.63±0.34 MPa	24.11±2.03 Mpa	27.05 ±1.48 Mpa	25.85±1.23 Mpa	22.53 ±0.78 Mpa	26.44 ±1.69 Mpa	45.75 ±0.55 Mpa	45.40±0.46 Mpa	36.56 ±1.03 Mpa	34.58±1.43 Mpa
	Tensile Modulus	1812±72 Mpa	1960 ±117 Mpa	2037±64 Mpa	/	2597.77 ±204.99 Mpa	2733.69±139.93 Mpa	2996.75 ±71.84 Mpa	2657.40 ±50.27 Mpa	1285.59 ±77.22Mpa	1609.62 ±86.92 Mpa	3225.74 ±210.01 Mpa	2949.78 ±546.63 Mpa	3147.78 ±272.68 Mpa	3205.59 ±32.99 Mpa
	Elongation at Break	3.9±0.3 %	1.22±0.13 %	2.43±0.27 %	/	1.11±0.04 %	0.96±0.09 %	1.00±0.08 %	1.12±0.18 %	2.10±0.11%	1.92 ±0.10 %	1.60±0.03%	1.61±0.10 %	1.36±0.07%	1.18±0.06 %