iPEEK® PEEK 500 FIL

Product Description

High performance thermoplastic material, **P**oly**E**ther**E**ther**K**etone (PEEK), semi crystalline, filament for Additive Manufacture by filament fusion and other melt extrusion 3D printing processes. Colour natural/ beige.

Typical Application Areas

Additive manufacturing processing. Filament Fusion printed parts, to achieve improved printed part strength and printability compared to PEEK polymer on most machines. For use in higher temperature applications and chemically aggressive environments. Low outgassing, suitable for sterilisation. Not suitable for medical implant applications. Product supplied vacuum packed with desiccant and dry when produced. Drying before use is recommended.

Dimension	Test Method	Units	Typical Value
Diameter	3 axis laser micrometer	mm	1.75
Linear density	iPEEK test method	g/10000 m	31,000

Packaging	
Spool Dimensions	200mm diameter
	70mm width
	55mm centre bore
Spool Material	Heat-resistant Polycarbonate
Nominal Weights	1.5Kg,1kg, 0.5 kg respectively
Nominal Lengths	500m ,322m, 161m respectively

Example Material Properties – Amorphous As printed				Orientation		
	CONDITIONS	TEST METHOD	UNITS	XY	YZ	ZX
Tensile Strength	Yield, 23°C	ISO 527	MPa	51 ± 6	57 ± 1	39 ± 5
Tensile Modulus	23°C	ISO 527	GPa	2.6 ± 0.3	2.4 ± 0.2	2.2 ± 0.1
Tensile Elongation	Break, 23°C	ISO 527	%	24 ± 9	17 ± 2	6 ± 1

Example Material Properties – Semicrystalline Annealed at 170°C 2hrs				Orientation		
	CONDITIONS	TEST METHOD	UNITS	XY	YZ	ZX
Tensile Strength	Yield, 23°C	ISO 527	MPa	64 ± 6	69 ± 4	43 ± 7
Tensile Modulus	23°C	ISO 527	GPa	3.3 ± 0.4	2.5 ± 0.4	2.7 ± 0.1
Tensile Elongation	Break, 23°C	ISO 527	%	15 ± 1	16 ± 3	5 ± 1

Thermal Data				
Melting Point	DSC	ISO 11357	°C	303
Glass Transition (Tg)	DSC (Onset)	ISO 11357	°C	151
	DSC (Midpoint)	ISO 11357	°C	154
Crystallisation Point	DSC	ISO 11357	°C	249

Flow				
Melt Viscosity	400°C, 1000s^{-1}	ISO 11443	Pa.s	245

Example Processing Conditions	
Drying Temperature / Time	120°C / 5h (residual moisture <0.02%)
Extrusion Temperature	380-400°C (Nozzle)
Chamber/Build-Space Temperature	Printing directly semi-crystalline: Above 150°C (see note below) Printing amorphous: Below 150°C (see note below)
Bed Temperature	20-40°C above chamber temperature, keeping below 150°C for amorphous print.
Annealing conditions	Slow heating rate (3°C/min ramp rate). 170-180°C, 2-4 hours. Optimization may be required.

Notes

Best results may be expected from elevated build-space temperatures and are machine specific. This datasheet represents properties that may be expected from build-space temperatures between 50-120°C on ISO 527-2 1A samples. Samples have been successfully produced on <120°C build-space temperatures, however higher performance may be expected from machines with >120°C build space temperatures. Results vary widely from machine to machine.

Annealing may be required to generate semi-crystalline parts, depending on the machine and process conditions used in printing. Semi-crystalline parts can be made in some machines by using chamber temperatures >150°C, however in other machines the best results may be achieved by printing parts with reduced crystallinity and subsequently annealing. Annealing temperatures between 170-180°C are recommended. Parts may deform if higher annealing temperatures are used. Depending on the print parameters, annealing conditions may require adjustment for best results.

Important notes:

1. Example values only. Not product specification.
2. Printing condition details: ISO 527-2 type 1A specimens printed on a 3D Gence F340 printer. Layer height: 0.15mm. Nozzle diameter: 0.4 mm. Nozzle temperature 380°C. Chamber temperature: 60°C. Bed temperature: 100°C. Infill: 100%. Raster angle: ± 45°. Contour speed: 20 mm/s. Hatch speed: 30 mm/s. ZX samples built with breakaway support structure – details available on request.
3. Data are generated in accordance with prevailing national, international and internal standards, and should be used for material comparison. Actual property values are highly dependent on part geometry, equipment configuration, extrusion deposition strategy and processing conditions. Properties may also differ for along flow and across flow directions and from different printers technologies and manufacturers.