VICTREX AM™ 200 FIL

Product Description

High performance thermoplastic material, **P**oly**A**ryl**E**ther**K**etone (PAEK), semi crystalline, filament for Additive Manufacture by filament fusion and other melt extrusion 3D printing processes, colour natural/beige. Improved interlayer adhesion, reduced shrink and warp and improved resistance to separation from the print bed or delamination, relative to general injection moulding and extrusion grades of PEEK polymer. Product supplied vacuum packed with dessicant and dry when produced, however may require further drying before use.

This product is in the beta phase. Contact a representative of the Product Management or Additive Manufacturing team at Victrex regarding availability.

Typical Application Areas

For 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.

Measurement and Tolerance Data	Test Method	Units	Typical Value
Diameter	3 axis laser micrometer	mm	1.75
Tolerance	3 axis laser micrometer	mm	+/- 0.05
Ovality	3 axis laser micrometer	%	3
Density	ISO 1183	g cm^{-3}	1.30
Linear Density		g/m	3.1

Packaging	
Spool Dimensions	200mm diameter
	70mm width
	55mm centre bore
Spool Material	Heat-resistant Polycarbonate
Nominal Weight	1Kg
Nominal Length (1Kg spool runnage)	322m

Typical Material Properties (printed)				Orientation		
	CONDITIONS	TEST METHOD	UNITS	XY	YZ	ZX
Tensile Strength	yield, 23°C	ISO 527	MPa	65	70	45
Tensile Modulus	23°C	ISO 527	GPa	3.3	2.5	2.7
Tensile Elongation	Break, 23°C	ISO 527	%	15	15	5.0

Results generated from parts printed on representative Filament Fusion machine with low temperature chamber. See Important Notes for details

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
Thermal Onset Degradation Point	TGA	ISO 11357	°C	549

Flow				
Melt Viscosity	360°C, 1000s^{-1}	ISO 11443	Pa.s	350
	360°C, 100s^{-1}	ISO 11443	Pa.s	600
	400°C, 1000s^{-1}	ISO 11443	Pa.s	250
	400°C, 100s^{-1}	ISO 11443	Pa.s	400
Melt Stability	1hr at 400°C (1000s^{-1} test)	ISO 11443	% change	1

Example Processing Conditions	
Drying Temperature / Time	120°C / 5h (residual moisture <0.02%)
Extrusion Temperature	380-420°C (Nozzle)
Build-Space Temperature	120-155°C (see note below)
Bed Temperature	140-160°C
Annealing conditions	Suggested starting point: 170°C, 2h hold, 3°C/min ramp rate. Optimization may be required.
Dimensional change on annealing	8-9% expansion in Z, 3-5% shrinkage in XY (Typical)

Notes on process conditions

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. Samples have been successfully produced on <120C build-space temperatures, however higher performance may be expected from machines with >120C 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 165-180°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. Slower up- and down-temperature ramp rates than recommended may result in better performance.

Important notes:

1. Processing conditions quoted in our datasheets are typical of those used in our processing laboratories.
2. 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, machine configuration, print-head path, and processing conditions. As represented in the table, properties in the printed part may differ along the filament and across the filament directions.
3. Mechanical evaluations were made from parts printed on a 3DGence F340 using a 0.15 mm layer height, 0.4 mm nozzle set at 380°C, and heated chamber set at 60°C. Parts were annealed at the suggested conditions before testing, Quoted mechanical values are taken from the mean of 12 repeats. Performance may vary with different machines, slicer settings, nozzle sizes and other process conditions.

Detailed data are available on our website www.victrex.com or upon request.

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