VICTREX AM™ 211 FIL

General Information

Product Description

High performance thermoplastic VICTREX LMPAEK™ polymer, a PEEK based copolymer in the PAEK semi crystalline family compounded with carbon fibre and extruded into filament. Black/ dark grey in colour. 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. Not suitable for medical implant applications. Product supplied vacuum packed with desiccant and dry when produced. Drying before use is recommended.

Material Properties

Physical	Nominal Value	Unit	Test Method
Density / Specific Gravity (Crystalline)	1.30	g/cm³	ASTM D792
Mechanical	**Nominal Value**	**Unit**	**Test Method**
Tensile Modulus			ISO 527
Young's : 23°C, Injection Molded	10300	MPa	
Young's, XY Orientation : 23°C, Filament Extrusion [1]	4700	MPa	
Young's, XY Orientation : 23°C, Filament Extrusion [2]	5500	MPa	
Young's, ZX Orientation : 23°C, Filament Extrusion [1]	3000	MPa	
Young's, ZX Orientation : 23°C, Filament Extrusion [2]	3200	MPa	
Tensile Stress			ISO 527
Break, 23°C, Injection Molded	151	MPa	
XY Orientation : Break, 23°C, Filament Extrusion [1]	68.0	MPa	
XY Orientation : Break, 23°C, Filament Extrusion [2]	89.0	MPa	
ZX Orientation : Break, 23°C, Filament Extrusion [1]	40.0	MPa	
ZX Orientation : Break, 23°C, Filament Extrusion [2]	33.0	MPa	
Tensile Strain			ISO 527
Break, 23°C, Injection Molded	2.2	%	
XY Orientation : Break, 23°C, Filament Extrusion [1]	2.4	%	
XY Orientation : Break, 23°C, Filament Extrusion [2]	2.2	%	
ZX Orientation : Break, 23°C, Filament Extrusion [1]	3.0	%	
ZX Orientation : Break, 23°C, Filament Extrusion [2]	2.0	%	
Flexural Modulus			ISO 178
23°C, Injection Molded	8800	MPa	
XY Orientation : 23°C, Filament Extrusion [2]	3100	MPa	
XZ Orientation : 23°C, Filament Extrusion [2]	6800	MPa	
Flexural Stress			ISO 178
Break, 23°C, Injection Molded	225	MPa	
XY Orientation : Break, 23°C, Filament Extrusion [2]	115	MPa	
XZ Orientation : Break, 23°C, Filament Extrusion [2]	169	MPa	
Impact	**Nominal Value**	**Unit**	**Test Method**
Notched Izod Impact Strength (Injection Molded)	3.6	kJ/m²	ISO 180
Fill Analysis	**Nominal Value**	**Unit**	**Test Method**
Melt Viscosity (400°C, 1000 sec^-1)	210	Pa·s	ISO 11443

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Additional Information

Packaging:

- Spool Dimensions: 200mm diameter; 70mm width; 55mm centre bore
- Spool Material: Heat-resistant Polycarbonate
- Nominal Lengths: Min 321 m/kg

Typical Processing Information

Extrusion	Nominal Value	Unit
Drying Temperature	120	°C
Drying Time	5.0	hr
Suggested Max Moisture	< 0.020	%
Melt Temperature	380 to 400	°C

Extrusion Notes

Nozzle/Hot end:

- Please use an abrasion resistant nozzle > 0.4 mm in diameter

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.

Annealing may be required to generate semi-crystalline parts, depending on the machine and process conditions used in printing.

VICTREX AM™ 211 may be printed with the same conditions as VICTREX AM™ 200, but further optimisation may be required.

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.

PEEK: PolyEtherEtherKetone;
PAEK: PolyArylEtherKetone

Mechanical test data generated on injection moulded specimens. Performance when printed will vary.

Printed parts were generated on 3ntr Spectral 30 with 0.4mm nozzle. Tnozzle=398°C, Tbed/chamber=120°C. Specimens were annealed post printing with gradual heating up to 200°C and cooled down slowly. Printing, annealing and most of the mechanical characterisation was performed by Add-Astra srl (www.add-astra.it Modena, Italy)

Guidance on typical performance in printed parts is available on request.

Please consult the Victrex AM Processing guide on www.victrex.com for more information.

Best results may be expected from elevated build-space temperatures and are machine specific.

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.

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.

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Notes

[1] Amorphous

[2] Crystalline Annealed

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