SINTERIT

PA11 Carbon Fiber

TECHNICAL DATA SHEET

PA11 Carbon Fiber

General description

PA 11 Carbon Fiber is a bio-derived (castor oil) powder composite material based on Polyamide 11 enhanced with Carbon Fiber for better performance and rigidity. It features a high strength-to-weight ratio and high thermal properties. Its well-balanced profile of mechanical and thermal properties while maintaining good impact strength makes it one of the strongest and most versatile materials available on the powder market dedicated to SLS printing technology.

Features:

- best tensile and flexural strength
- best thermal resistance
- good impact resistance
- high stiffness
- good elongation at break
- good surface quality
- good chemical resistance

Applications:

- automotive (high performance parts, metal replacement parts)
- universities/labs (mechanical, composites)
- extreme applications (motorsports, lightweight structures, temperature)
- maintenance and Repair
- medical - prosthesis
- aerospace models

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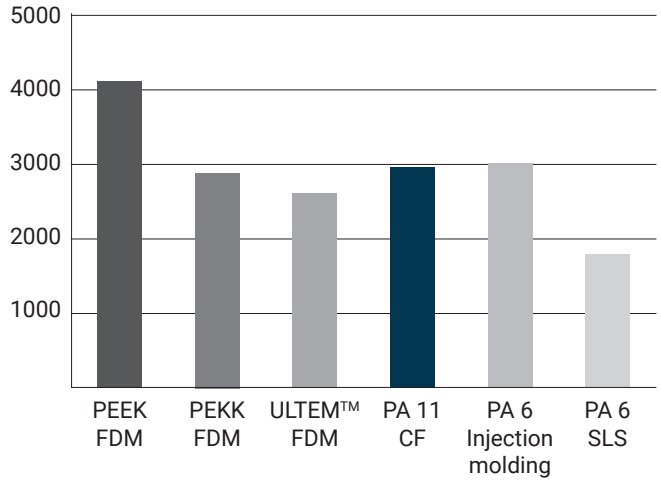
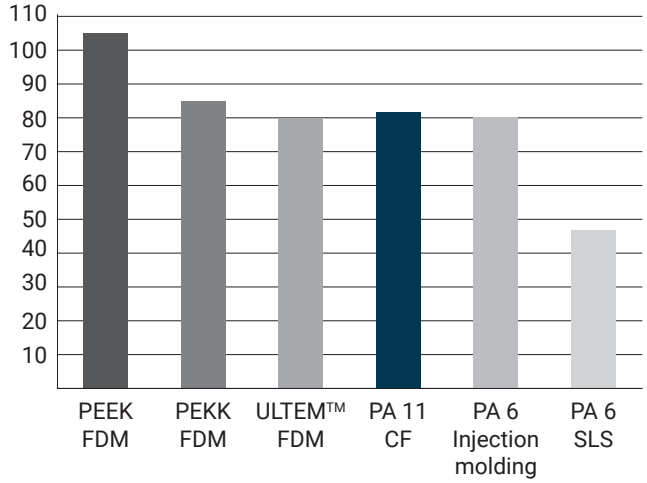
Comparison to high-performance materials

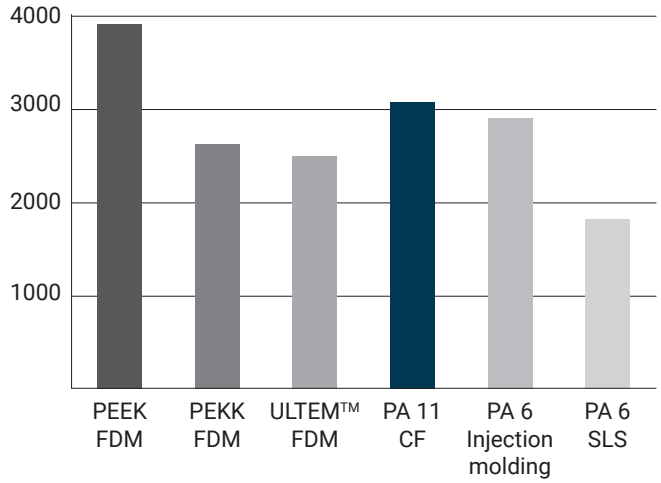
Tensile Modulus [Mpa]



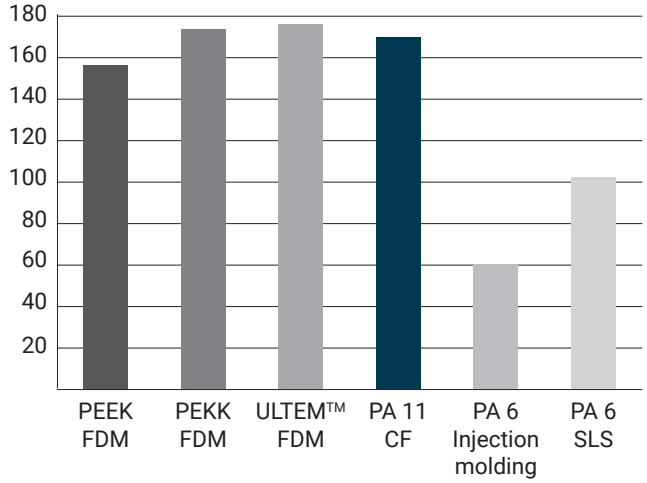
Tensile Strength [Mpa]



Flexural Modulus [Mpa]

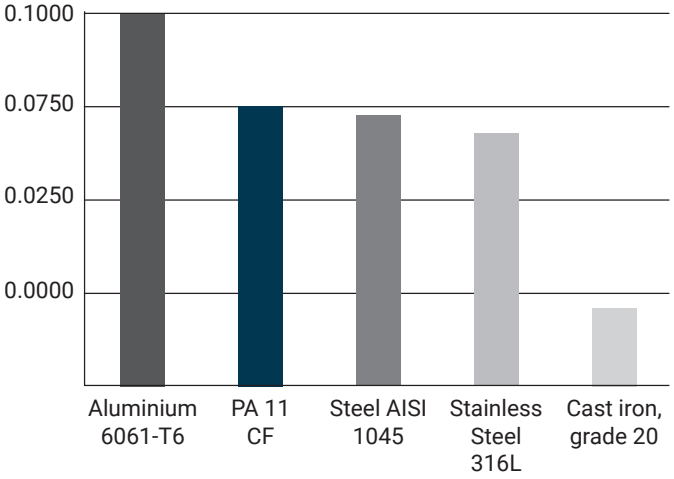


Heat Deflection Temperature at 1.8 Mpa [°C]

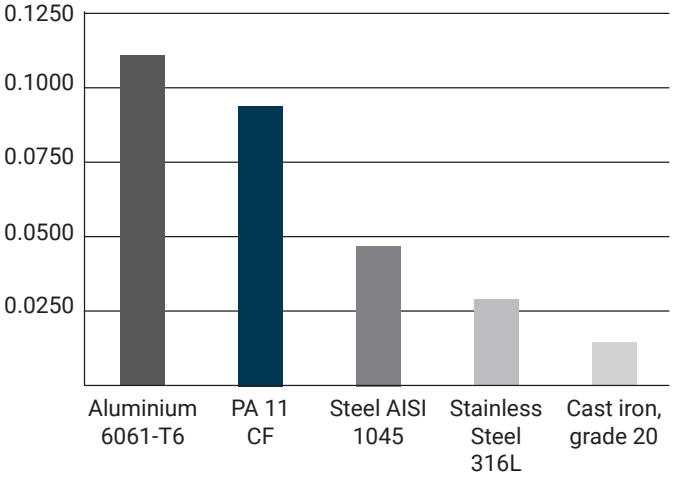


Comparison to metals

Specific strength (tensile strength/density)



Specific strenght (flexural strength/density)



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General properties			Test Method
Dedicated for	Lisa PRO, Lisa X, NILS 480		
Software	Sinterit Studio Advanced		
Nitrogen needed	Yes		
Colour	black		
Refresh ratio[1]	40	%	
Bulk density	540	kg/m^3	PN-EN ISO 60:2010
Printout density	1.09	g/cm^3	PN-EN ISO 845:2010
Printout water absorption	0.86	%	PN-EN ISO 62:2008

Thermal properties			Test Method
Melting temperature	197	°C	PN-EN ISO 11357
Heat Deflection Temperature A at 1.8 MPa	170	°C	PN-EN ISO 75-2:2013-06 / PN-EN ISO 75-2:1998
Heat Deflection Temperature B at 0.45 MPa	191	°C	PN-EN ISO 75-2:2013-06 / PN-EN ISO 75-2:1998

Mechanical properties			Test Method
Flexural Strength (X direction)	100	MPa	PN-EN ISO 178:2019
Flexural Modulus (X direction)	3050	MPa	PN-EN ISO 178:2019
Flexural Strength (Z direction)	66.1	MPa	PN-EN ISO 178:2019
Flexural Modulus (Z direction)	1420	MPa	PN-EN ISO 178:2019
Tensile Strength (X direction)	81	MPa	PN-EN ISO 527-1:2012
Tensile Modulus (X direction)	2950	MPa	PN-EN ISO 527-1:2012
Elongation at Break (X direction)	24.5	%	PN-EN ISO 527-1:2012
Tensile Strength (Z direction)	47.3	MPa	PN-EN ISO 527-1:2012
Tensile Modulus (Z direction)	1490	MPa	PN-EN ISO 527-1:2012
Elongation at Break (Z direction)	17.9	%	PN-EN ISO 527-1:2012
Impact Strength (Charpy - unnotched)	113.65	kJ/m^2	PN-EN ISO 179-1:2010
Shore Hardeness in scale	D81		PN-EN ISO 868:2005
Storage Modulus (X direction) @23 °C[2]	4575	MPa	PN-EN ISO 6721
Loss Modulus (X direction) @23 °C[2]	172	MPa	PN-EN ISO 6721
Storage Modulus (Z direction) @23 °C[2]	3418	MPa	PN-EN ISO 6721
Loss Modulus (Z direction) @23 °C[2]	105	MPa	PN-EN ISO 6721

1. Refresh ratio is the amount of refreshing powder that is required to be mixed after the printing with unsintered material.
2. Based on Dynamic mechanical analysis with amplitude 50um, frequency 10Hz, initial force: 10N.

Information provided within this document are average values for reference and comparison only. All tests were performed with print samples from Lisa/Lisa Pro printers. Parameters presented in this specification are subject to change. Final part properties may vary based on printed part design and print orientation. All mechanical tests were carried out on samples conditioned to ISO standards only, at (23±2)°C and (50±5)% r. h.

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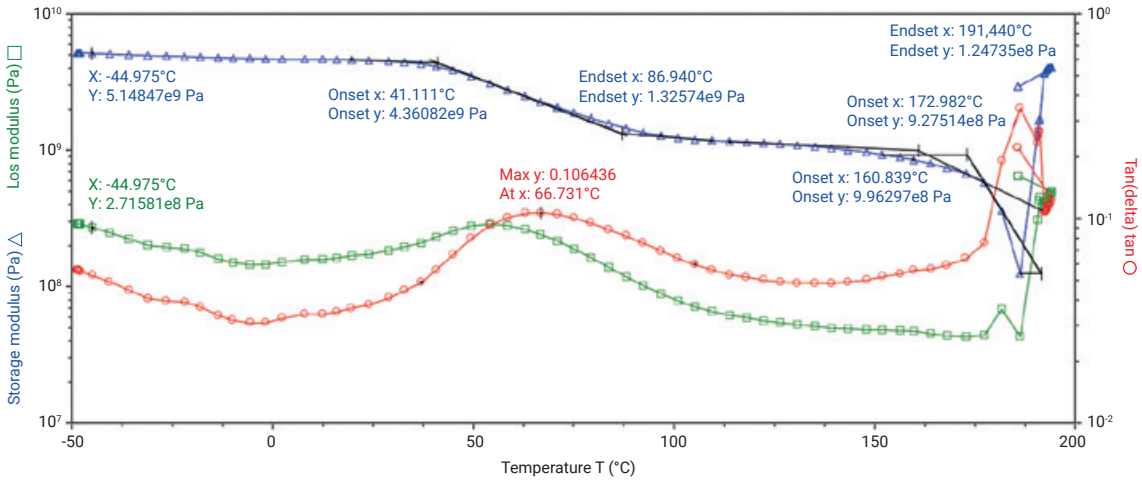
Dynamic Mechanical Analysis (X axis)

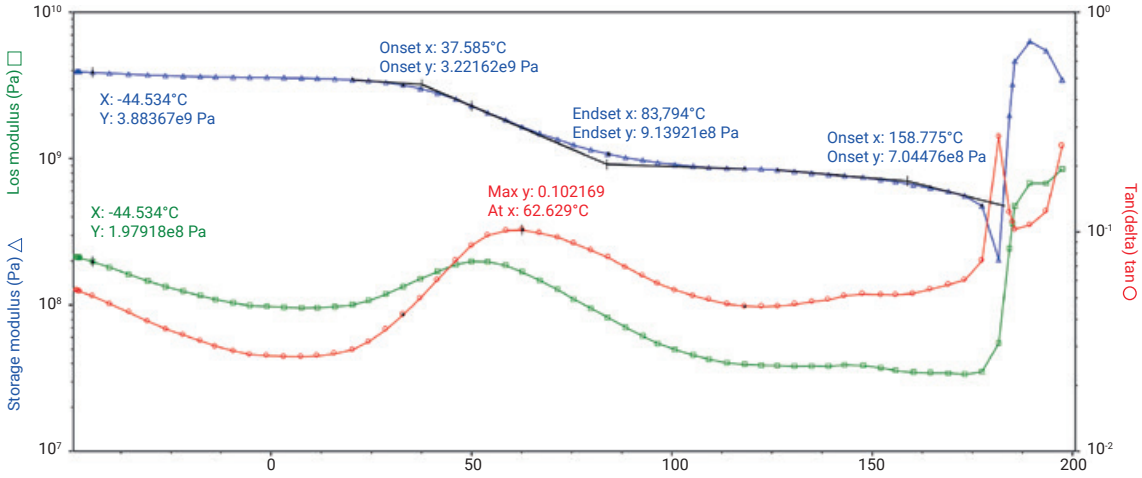
Flexural test: amplitude 50 µm, frequency 10 Hz, initial force: 10 N



	Range 1 (glassy region)		Range 2 (glass transition region)			Range 3 (rubbery plateau)	
Temperature [°C]	-44.975	41.111	41.111	54.180	86.940	86.940	160.839
Storage Modulus [MPa]	5148	4361	4361	3105	1326	1326	996
Loss Modulus [MPa]	271	233	233	287	124	124	47

Dynamic Mechanical Analysis (Z axis)

Flexural test: amplitude 50 µm, frequency 10 Hz, initial force: 10 N



	Range 1 (glassy region)		Range 2 (glass transition region)			Range 3 (rubbery plateau)	
Temperature [°C]	-44.534	37.585	37.585	54.180	83.794	86.940	158.775
Storage Modulus [MPa]	3884	3222	3222	2292	914	914	705
Loss Modulus [MPa]	198	152	152	199	83	83	35

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