TECHNICAL DATA SHEET

Roboze Carbon PEEK



Overview

Carbon PEEK is a composite material consisting of a PEEK matrix reinforced with 20 wt.% chopped carbon fibers. The carbon fiber reinforcement significantly increases the tensile strength, stiffness, and load-bearing capability of the material compared to unfilled PEEK, enabling its use in a wider range of demanding engineering applications.

Compared to neat PEEK, Carbon PEEK exhibits higher HDT , a lower coefficient of linear thermal expansion (CLTE), resulting in improved dimensional stability. Combined with the excellent chemical resistance typical of semi-crystalline polymers, these characteristics provide outstanding mechanical performance and long-term stability.

The addition of carbon fibers also reduces the coefficient of, making the material particularly suitable for wear applications.

Carbon PEEK is among the highest-performance thermoplastic composites available for demanding industrial applications.

Its high mechanical strength, excellent wear and abrasion resistance, dimensional stability, and resistance to harsh operating environments make it an ideal candidate for replacing metal components in lightweight, high-performance applications.

Applications

Carbon PEEK is suitable for both functional prototyping and end-use components, providing reliable performance in applications requiring high mechanical strength and long-term durability.

Its versatility enables adoption across a wide range of industries, including aerospace and defense, automotive, oil and gas, manufacturing, and motorsport.

The combination of its properties makes Carbon PEEK particularly suitable for replacing metal components in high-performance applications. This enables significant weight reduction while maintaining the reliability required for demanding service conditions.

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Carbon PEEK properties Summary

PHYSICAL PROPERTIES

PROPERTY	OPERATING CONDITIONS	UNITS	VALUE	TEST METHOD
Specific gravity		g/cm^3	1.41	ASTM D792
Glass transition temperature (T_g)	20 °C/min heating and cooling rate, in air	°C	149	Differential Scanning Calorimetry (DSC)
Melting point (T_m)	20 °C/min heating and cooling rate, in air	°C	341	Differential Scanning Calorimetry (DSC)
Service temperature (Long term)		°C	260	ISO 2578
Reinforcing phase (carbon fibers)		% by weight	20	
Colour			Black opaque	

The information may come from the raw material, the semi-finished product.
Specific individual tests are recommended according to the conditions required for final implementation

MECHANICAL PROPERTIES

The specimens were manufactured with SlizeR, proprietary Roboze slicing software, on the **ARGO 500 Hyperspeed MR** platform using the following configurations, in accordance with the operating process instructions specified in the relevant technical documents shared by Roboze. (*Material Setup Table , Extruder Overview , Buildsheet Overview*)

The vertical specimens were printed using the proprietary anti-bending geometry available in SlizeR for each applicable testing standard.

PRINTING PROFILE	TIP	N.SHELL	INFILL ANGLE	INFILL DENSITY
Production (Support : Carbon PEEK)	TIP 5- B1 (0.6 mm)	2	+/-45	100 %
Production Dual (Support : Kronos B2)	TIP 5- B1 (0.6 mm)	2	+/-45	100%

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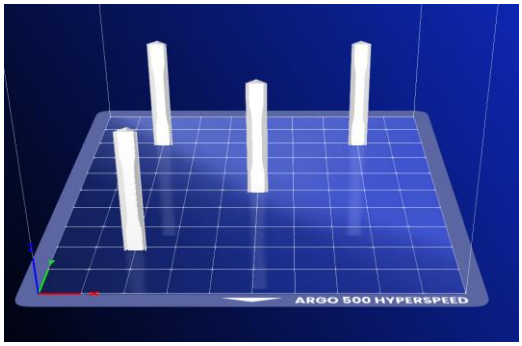


Figure 1-Left Side Configuration

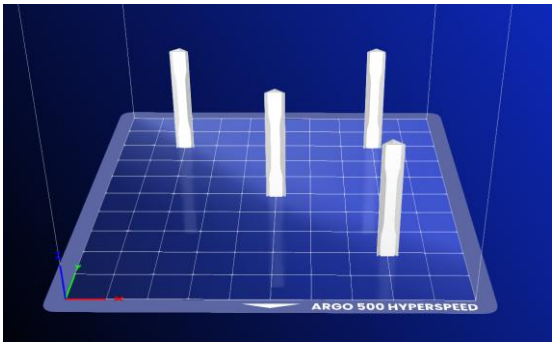


Figure 2-Right Side Configuration

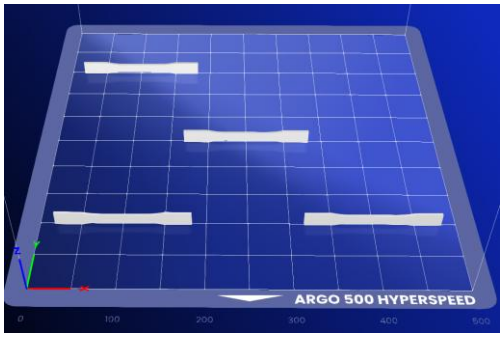


Figure 3-Left side Configuration

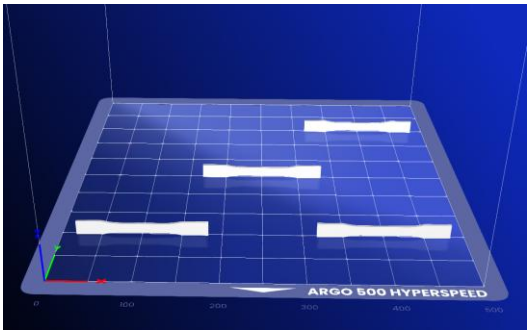


Figure 4-Right Side Configuration

PRODUCTION PROFILE- TIP 5- B1 (0.6 mm)- PRODUCTION PROFILE DUAL- TIP 5- B1 (0.6 mm)					
PROPERTY	OPERATING CONDITIONS	UNITS	TYPICAL VALUES [1]		TEST METHOD
			XZ	ZX	
Tensile Strength	25 °C	MPa	114,31 (±2,94)	47,84 (±4,67)	ASTM D638, type I
Young's Modulus	25 °C	GPa	8,481 (±0,186)	3.614 (±0,104)	ASTM D638, type I
Elongation at break	25 °C	%	2,612 (±0,175)	2,163 (±0,214)	ASTM D638, type I

[1] Although data obtained under controlled laboratory conditions provide a useful indication of the chemical, physical, and mechanical properties of a material and allow comparison between different materials, the measured values may differ from those achieved in the final printed component.
Such differences may arise from geometric features, manufacturing defects, and process-related factors that influence material performance. Variations in thermal history, degree of crystallinity, and the distribution, dispersion, and orientation of the reinforcing phase may also affect the final properties of the component.
In addition, the performance of polymeric materials is influenced by operating temperature and environmental conditions, including solar radiation, humidity, and other service-related factors. These effects should be carefully considered during the design phase, taking into account both short-term and long-term operating conditions.
For this reason, Roboze recommends producing and evaluating a prototype under the intended service conditions during the design phase to validate the component's performance for the specific application.

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CHEMICAL COMPATIBILITY

CHEMICAL	RESISTANCE			
	EXCELLENT	GOOD	LIMITED	LOW
Acetone	X			
Acids with pH <3		X		
Acids with pH 3:6	X			
Alcohols	X			
Alkyl halides			X	
Antifreeze	X			
Bases with pH >10	X			
Bases with pH 8:10	X			
Benzene	X			
Brake system fluid	X			
Butane	X			
Butanone (MEK)		X		
Demineralized water	X			
Ethanol	X			
Ester	X			
Methane	X			
Mineral oil	X			
Petroleum fuels	X			
Petroleum greases	X			
Phenols				X
Propane	X			
Silicone greases/oils	X			
Transmission fluids	X			
Windshield washer fluid	X			

Chemical compatibility ratings are provided as general guidance for Carbon PEEK under standard laboratory conditions (approximately 23°C). The actual resistance of the material depends on several factors, including chemical concentration, exposure time, operating temperature, and applied mechanical stresses. Carbon fiber reinforcement does not significantly alter the intrinsic chemical resistance of the PEEK matrix. The suitability of the material for a specific application should always be verified through testing under actual service conditions.