ESSENTIUM

ADDITIVE X

Essentium PA-CF
TECHNICAL DATA SHEET

ESSENTIUM PA-CF

Essentium PA-CF is a carbon fiber-infused polyamide filament specially formulated for additive manufacturing. Essentium PA-CF provides exceptional strength, durability, thermal stability, and stiffness that is customary of carbon fiber materials. Essentium PA-CF is readily printable with a wide processing window, providing a highly accessible engineering-grade solution or open platform and even open-air printers. It is important to note, the mechanical properties of PA may change with water uptake as this material is moisture sensitive. The best prints with Essentium PA typically occur utilizing a glass bed and a bed adhesion solution, such as a PA-solvent liquid compound.

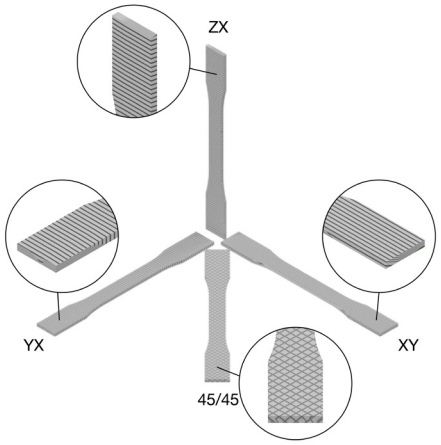
MECHANICAL PROPERTIES

Metric	Test Method	Print Orientation			
		XY	45/45	YX	ZX
Ultimate Tensile Strength, MPa	ISO 527-2	55.9 (0.3)	29.1 (0.5)	21.5 (0.4)	19.3 (0.9)
Tensile Modulus, GPa	ISO 527-2	2.16 (0.15)	0.95 (0.07)	0.61 (0.06)	0.48 (0.02)
Strain at Break, %	ISO 527-2	18 (1)	16 (1)	14 (2)	22 (1)
Flexural Strength, MPa	ISO 178	72.8 (1.6)	38.4 (0.3)	23.1 (1.0)	22.3 (0.8)
Flexural Modulus, GPa	ISO 178	2.39 (0.05)	1.00 (0.03)	0.54 (0.02)	0.56 (0.01)
Notched Izod Impact Strength, kJ/m^2	ISO 180/A	48 (2)	38 (3)	19 (2)	9.7 (1.3)

Standard deviations listed in parentheses

MATERIAL PROPERTIES

Property	Method	Value
Melting Point, ˚C	ASTM D3418	192
HDT @ 0.45 MPa, ˚C	ASTM D648	178



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MATERIAL HANDLING AND DRYING

Essentium PA-CF is an extremely hygroscopic thermoplastic and will absorb moisture from humid air. Keep the material in the vacuum sealed packaging until you are ready to print with it. PA-CF filament should always be fed to the printer in a dry container and stored in a dry cabinet. If the material does absorb more than 500ppm moisture, it should be dried in a low dew point (< -40˚C) oven or vacuum oven at 100 – 120˚C for 4 – 8 hours.

RECOMMENDED HSE PRINT SETTINGS			
0.4mm Hozzle			
Extrusion Width, mm	0.35 – 0.5	Hozzle Temperature, ˚C	240 – 400
Layer Height, mm	0.15 – 0.25	Bed Temperature, ˚C	90 – 100
Print Speed, mm/s	50 – 400	IR Temperature, ˚C	20 – 40
Infill, %	15 – 75	Fan Speed, %	0 – 40
0.8mm Hozzle			
Extrusion Width, mm	0.7 – 0.9	Hozzle Temperature, ˚C	230 – 400
Layer Height, mm	0.3 – 0.35	Bed Temperature, ˚C	90 – 100
Print Speed, mm/s	40 – 160	IR Temperature, ˚C	20 – 40
Infill, %	15 – 75	Fan Speed, %	0 – 40

RECOMMENDED FDM PRINT SETTINGS			
Nozzle Temperature, ºC	265 – 300	Fan Speed, %	0 – 50
Bed Temperature, ºC	85 – 100	Bed Material	G-10/FR4 or Glass
Print Speed, mm/s	30 – 60	Bed Adhesion Method	Magigoo® PA or PVA glue
First Layer Speed, mm/s	15 – 30	Infill Density, %	<75

KEY FEATURES:

- Excellent toughness
- High impact resistance
- Optimized for high flow and ease of printing

APPLICATIONS INCLUDE:

- Handheld fixtures
- Orthotics and prosthetics
- Jigs and fixtures that need increased toughness
- Industrial grade parts

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