

Nylon 12CF

Nylon 12CF is PA12 reinforced with 35% chopped carbon fiber. It has the highest flexural strength and stiffness-to-weight of any FDM thermoplastic, which makes it our metal-replacement material for strong, lightweight tooling and load-bearing parts.

153 MPa

Flexural strength, XZ orientation (ASTM D790)

9.46 GPa

Tensile modulus, XZ orientation

1.19

Specific gravity at 23 °C

About this material

Nylon 12CF is a PA12 filament reinforced with chopped carbon fiber, 35% by weight. The fiber gives it the highest flexural strength and stiffness-to-weight ratio of any FDM thermoplastic, making it a genuine metal replacement in the right applications. Tensile modulus reaches 9.46 GPa and flexural strength 153 MPa in the strong orientation, with heat deflection between 130 and 168 °C. It is highly directional, so we align the build with the load path.

Typical applications

Strong, lightweight tooling; metal-replacement brackets and mounts; structural functional prototypes; and select load-bearing end-use parts where high stiffness-to-weight is the deciding factor.

Physical properties

PROPERTY	TYPICAL VALUE	TEST METHOD
Reinforcement	35% chopped carbon fiber	—
Specific gravity	1.19 (at 23 °C)	ASTM D257
HDT at 66 psi	160 °C XY / 168 °C ZX	ASTM D648 B
HDT at 264 psi	130 °C XY / 154 °C ZX	ASTM D648 B
Glass transition (Tg)	37.5 °C (99.5 °F)	ASTM D7426
Thermal conductivity (30 °C)	0.599 W/m-K	ASTM E1952

Tensile properties (ASTM D638)

PROPERTY	F900 XZ	F900 ZX	450MC XZ	450MC ZX
Yield strength [MPa]	No yield	No yield	77.5	38.3
Strength at break [MPa]	83.5	32.7	76.5	38.4
Elongation at break [%]	2.4	1.2	3.2	2.2
Tensile modulus [GPa]	9.46	3.00	7.91	2.64

The carbon fiber aligns with the print path, so XZ (along the layers) is far stiffer and stronger than ZX (across the layers). Typical values at 0.25 mm (0.010 in.) layer height.

Flexural properties (ASTM D790)

PROPERTY	F900 XZ	F900 ZX	450MC XZ	450MC ZX
Strength at break [MPa]	153	62.4	152	67.4
Strain at break [%]	2.65	3.10	2.7	3.6
Flexural modulus [GPa]	11.1	2.34	11.0	2.18

Compression and impact (F900)

PROPERTY	XZ ORIENTATION	ZX ORIENTATION
Compressive yield strength [MPa]	110	141
Compressive modulus [GPa]	6.78	3.67
Izod impact, notched [J/m]	106	24
Izod impact, unnotched [J/m]	346	121

Compression per ASTM D695, Izod impact per ASTM D256. A thicker 0.020 in. (0.508 mm) layer with the T40C tip pushes XZ tensile strength and modulus higher still (up to ~124 MPa and 15.4 GPa).

Source and notes

Values are drawn from the Stratasys FDM Nylon 12CF material data sheet, document MDS_FDM_Nylon 12CF_0925a ([OEM source](#)). Stratasys lists these as typical values for reference and comparison, not for design specifications or quality control. Fiber-reinforced properties vary strongly with orientation, layer height, moisture, and machine.

Full page: <https://www.evologymfg.com/manufacturing-capabilities/fdm-fused-deposition-modeling/nylon-12cf>