

GENERAL INFORMATION

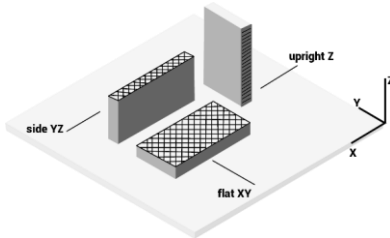
PolyEthylene Naphthalate High Flow (PEN-HF) filament offers FDA food-contact approval, along with excellent chemical resistance, and mechanical properties. 3D-printed PEN specimens have passed extensive testing, including dishwasher safety, no harmful chemical leaching, odor-lessness, scratch resistance and more. It retains mechanical properties at elevated temperature to handle hot-liquids and sterilization processes. PEN-HF prints with minimal warping at speeds of up to 300 mm/s, producing watertight parts (after flow calibration) without additional post-processing. With a low friction coefficient of 0.17 (ASTM D1894), it is an alternative material to POM and exhibits low creep. For optimal and safe printing results, use 0.2, 0.25, or 0.4 mm stainless steel nozzles. Independent lab testing has shown no residual bacteria with a <0.14mm layer height after standard dishwashing or soapy cleaning. PEN-HF effectively blocks UV light while maintaining high transparency. In many applications, PEN-HF serves as an easy-to-print alternative to transparent polycarbonate (PC), delivering a balanced of performance wherever chemical resistance, UV protection, food safety, and printability are critical.

IMPORTANT KEY FEATURES

- FDA food-contact approved, ensuring consumer health and safety
- Temperature resistance: 121 °C (pre-annealing), 166 °C (annealed)
- Fast printing speeds up to 300 mm/s
- Exceptional chemical resistance and UV blocking
- Easy 3D printing on desktop printer, even with a 0.2-0.25 mm nozzle



PRINTING ORIENTATION



The FDM process creates parts with a layered structure, causing mechanical properties to be anisotropic based on print orientation.^{*1}

- Flat XY orientation: predominant mechanical strength from infill
- Side YZ orientation: predominant mechanical strength from walls
- Upright Z orientation: interlayer adhesion strength.

	Test Method #	PEN-HF		
		XY	YZ	ZX
Tensile strength (MPa)	ISO 527-2 50 mm/min	42.5	29.0	23.7
Elongation (%)	50 mm/min	1.8	1.3	0.8
Tensile modulus (MPa)	1 mm/min	2315	2287	2386
	ISO 178:2019			
Flexural strength (MPa)	2 mm/min	98	-	-
Flexural modulus (MPa)	2 mm/min	2145	-	-
	ISO180:2019			
Izod impact strength (kJ/m ²)	notched	2.1	-	-
	ISO 752/B			
HDT (pre-annealed) (°C)	0.45 MPa	117		
HDT (pre-annealed) (°C)	1.82 MPa	112		

CHEMICAL RESISTANCE TABLE *2

Organic Solvent	PEN-HF	PPSU	Inorganic Solvent	PEN-HF	PPSU
Acetic acid (20%)	A	A	Ammonium chloride (25%)	A	A
Acetone	B	D	Ammonia aq. (28%)	C	A
Alcohols	A	B	Hydrochloric acid (37%)	A	A
Chloroform	C	C	Hydrogen peroxide (30%)	A	B
Dimethyl sulfoxide	C	C	KOH (30%)	B	A
Ethers	A	B	NaCl sat. solution	A	A
Ethyl acetate	A	D	NaHCO ₃ sat. solution	A	A
Gasoline	A	A	NaOCl	A	A
Hexane	A	B	NaOH (30%)	A	A
Methyl ethyl ketone	A	C	Nitric acid (20%)	A	A
Toluene	A	D	Sulfuric acid (10%)	A	A

FILAMENT SPECIFICATIONS

Diameter (mm)	1.75 ± 0.03 & 2.85 ± 0.06
Color	translucent
Net filament weight (g)	200 & 1000

PRINTING PROPERTIES

Nozzle sizes (mm)	0.2 - 1.0	Recommend stainless steel or hardened steel
Nozzle temperature (°C)	265 - 275	Recommend settings, may different according to printer and object
Bed temperature (°C)	80 - 90	
Retraction speed (mm/s)	30 - 45	
Retraction length (mm)	2 - 4	
Speed (mm/s)	100 - 180	For mechanical properties and walls
	240 - 300	For infill or draft prototypes
Part cooling fan (%)	0 - 10	May use higher colling speed for bridges
Bed adhesive	glue stick or PVP	
Storage	vacuum with desiccant	Long term storage
	dry-box (RH<20%)	During use and printing
Drying	60°C for 8 hours	
Support filament	HIPS or PVA	

NOTES

*1 The values reported in TDS represent the average from a batch of 10 test specimens. For tensile, flexural, and impact properties of the 3D printed test specimens were produced using a 0.4 mm nozzle, 100% infill, print speed of 60mm/s, a nozzle temperature of 270°C and a build plate temperature of 80°C. FLXR Engineering is continuously working on expanding the TDS data

*2 The chemical resistance of PEN is evaluated by the following test method:

- Specimens are immersed in the chemical (liquid) at 23°C for 30 days.
- Ranking definition: A: weight change <1%, tensile strength retained >95%; B: weight change between 1~10%, tensile strength retained >75%; C: weight change >10%, tensile strength retained <75%; D: swelled or dissolved within 120 hours.

DISCLAIMER

This information sheet has been prepared with the highest level of care. Unless otherwise stated, it is intended solely for general informational purposes. It should not be relied upon for any specific purpose, and no representations or warranties are made regarding its accuracy or completeness.

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