FLXR ENGINEERING

PEN HF

Technical Data Sheet
3D Printing Filament



GENERAL INFORMATION

PEN HF (*Polyethylene Naphthalate High-Flow*) is a food-contact approved 3D printing material. It is suitable for all food types and food-processing temperature ranges, in accordance with FDA, EU, and Japan food-contact regulations.

It is safe for food contact as printed, no coating or additional surface treatment required.
Its low-adsorption surface helps reduce staining, odor retention, and taste carryover between food batches, supporting easy cleaning and consistent hygiene control.

3D printed PEN HF parts remain dimensionally stable under hot-fill food-processing conditions.
The material also offers wear resistance comparable to POM, reducing concerns about microplastic release into food.
PEN HF is PFAS-free for food-processing teams moving away from PFAS-based materials.

COMPLIANCE

PEN HF	FDA 21 CFR 177.1637; EU 10/2011; EC 1935/2004; 食品衛生法; REACH; RoHS; PFAS-free; BPA-free

FOOD-CONTACT COMPATIBILITY

	Type I Non-acid, aqueous foods	Type II Acid, aqueous foods	Type III Aqueous foods containing fat	Type IV Dairy products	Type V Low-moisture fats	Type VI-C Beverages; >8% alcohol	Type VII Moist baked goods	Type IX Dry solids with free fat on surface
Example	Water	Vinegar	Mayonnaise	Cream	Cooking oil	Whiskey	Donuts	Chocolate
PEN HF (-20-121˚C)	✓	✓	✓	✓	✓	✓	✓	✓

FILAMENT SPECIFICATION

Diameter (mm)	1.75 ± 0.03 mm / 2.85 ± 0.06 mm
Color	Nearly transparent
Net filament weight (g)	200 g (+ 0-3%) / 1,000 g (+ 0-3%)
Manufacturing environment	Manufactured and packaged in an ISO Class 8 cleanroom
Country of manufacture	Taiwan
Packaging	Aluminum-foil vacuum pack with desiccant

MATERIAL PROPERTIES

Material	Virgin Polyethylene Naphthalate (PEN)
Density (ISO 1183)	1.325 g/cm^3
Sterilization compatibility	Alcohol-based disinfectants, hypochlorite-based disinfectants, UV sterilization
UV absorbance	UV light below 383 nm is absorbed, protecting the contents. The material retains its mechanical properties under UV sterilization.

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RESPONSIBLY MADE IN TAIWAN

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PEN HF

PHYSICAL PROPERTIES

	Test Method *1	PEN Natural		
	ISO 527-2	XY	YZ	ZX
Tensile strength (MPa)	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	98.0	-	-
Flexural modulus (MPa)	2 mm/min	2154	-	-
	ISO 180:2019			
Izod impact strength (kJ/m²)	notched	2.1	-	-

3rd party testing by: SGS

THERMAL PROPERTIES

	ISO 75-2/B	
HDT (Amorphous)	0.45 MPa	117˚C
HDT (Amorphous)	1.82 MPa	112˚C

3rd party testing by: SGS

PRINTING PROPERTIES

Nozzle sizes (mm)	0.2 - 1.0	Recommend stainless steel or hardened steel
Nozzle temperature (°C)	265 - 280	Recommended settings may different according to printer and object
Bed temperature (°C)	75 - 90	
Chamber temperature (°C)	45 ± 5	
Speed (mm/s)	80 - 140 180 - 300	For 1st layer and walls For infill or draft prototypes
Part cooling fan (%)	0 - 10	May use higher cooling speed for bridges
Retraction speed (mm/s)	30 - 45	
Retraction length (mm)	2 - 7	2 - 4 mm for DD; 4 - 7 mm for Bowden
Bed adhesive	glue stick or PVP	
Drying	65 - 75 ˚C for 4 - 6 hours	Prior to use and if excessive stringing or surface defects
Support material	HIPS or PVA	
Storage	vacuum with desiccant dry-box (< 20% RH)	Long term storage During use and printing

CHEMICAL RESISTANCE TABLE*2

Organic Solvent	PEN HF	PPSU
Acetic acid (20%)	A	A
Acetone	B	D
Alcohols	A	B
Chloroform	C	C
Dimethyl sulfoxide	C	C
Ethers	A	B
Ethyl acetate	A	D
Gasoline	A	A
Hexane	A	B
Methyl ethyl ketone	A	C
Toluene	A	D

Inorganic Solvent	PEN HF	PPSU
Ammonium chloride (25%)	A	A
Ammonia aq. (28%)	C	A
Hydrochloric acid (37%)	A	A
Hydrogen peroxide (30%)	A	B
KOH (30%)	B	A
NaCl sat. solution	A	A
$NaHCO_3$ sat. solution	A	A
NaOCl	A	A
NaOH (30%)	A	A
Nitric acid (20%)	A	A
Sulfuric acid (10%)	A	A

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 75°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.

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