

FDM HIPS



FDM Thermoplastic Filament

The information presented are typical values intended for reference and comparison purposes only. They should not be used for design specifications or quality control purposes.



Overview

FDM® HIPS (high-impact polystyrene) is a low-cost, general-use 3D printing thermoplastic. It offers similarities to ABS but has high impact resistance making it suitable for printing lower-requirement jigs, fixtures and prototypes at a reduced cost.

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Ordering Information

Table 1. HIPS Filament Ordering Information

Part Number	Description
Filament Canisters	
355-70000	HIPS, 92 cu in. - Plus
355-70080	SUP1500B, 92 cu in. - Plus
Printer Consumables	
511-10401	T16 tip
511-10301	T12 tip
325-00300	Low Temperature build sheet, 0.02 x 26 x 38 in. (0.51 x 660 x 965 mm)
325-00100	Low Temperature build sheet, 0.02 x 16 x 18.5 in. (0.51 x 406 x 470 mm)

Physical Properties

Table 2. HIPS Physical Properties

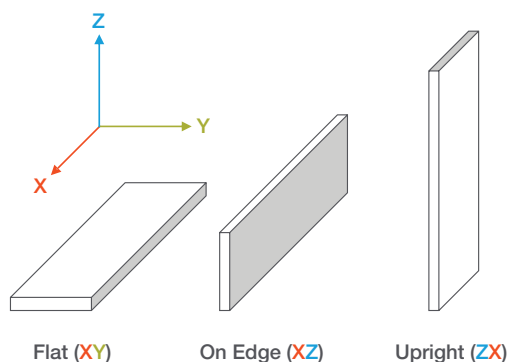
Property	Test Method	Typical Values	
		XY	XZ/ZX
HDT @ 66 psi	ASTM D648 Method B	102.8 °C (217.1 °F)	101.5 °C (214.7 °F)
HDT @ 264 psi	ASTM D648 Method B	102.1 °C (215.8 °F)	100.8 °C (213.5 °F)
Tg	ASTM D7426 Inflection Point	101 °C (214 °F)	

Mechanical Properties

Samples were printed with 0.010 in. (0.254 mm) layer height on the Fortus 450mc and F900®. For the full test procedure please see the [Stratasys Materials Test Procedure](http://www.stratasys.com) on www.stratasys.com.

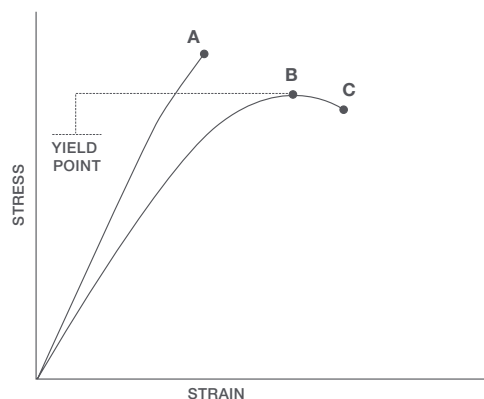
Print Orientation

Parts created using FDM are anisotropic as a result of the printing process. Below is a reference of the different orientations used to characterize the material.



Tensile Curves

Due to the anisotropic nature of FDM, tensile curves look different depending on orientation. Below is a guide of the two types of curves seen when printing tensile samples and what reported values mean.



A = Tensile at break, elongation at break (no yield point)

B = Tensile at yield, elongation at yield

C = Tensile at break, elongation at break

Table 3. HIPS Mechanical Properties (Fortus 450mc - T16 Tip)

		XZ Orientation ¹	ZX Orientation ¹
Tensile Properties: ASTM D638			
Yield Strength	MPa	26.0 (0.36)	23.5 (0.36)
	psi	3770 (52)	3410 (52)
Elongation @ Yield	%	1.6 (0.030)	1.5 (0.030)
Strength @ Break	MPa	19.6 (0.46)	20.3 (0.69)
	psi	2840 (67)	2950 (100)
Elongation @ Break	%	8.7 (0.69)	2.8 (0.44)
Modulus (Elastic)	GPa	1.98 (0.013)	1.93 (0.035)
	ksi	287 (1.9)	281 (5.1)
Flexural Properties: ASTM D790, Procedure A			
Peak Stress	MPa	50.8 (0.54)	44.0 (1.2)
	psi	7370 (78)	6380 (170)
Flex Yield Strain	%	3.5 (0.18)	3.2 (0.19)
Modulus	GPa	2.24 (0.028)	1.85 (0.043)
	ksi	325 (4.0)	268 (6.2)
Impact Properties: ASTM D256, ASTM D4812			
Notched	J/m	74.7 (3.7)	44.6 (5.3)
	ft*lb/in.	1.40 (0.070)	0.835 (0.10)
Unnotched	J/m	827 (190)	132 (11)
	ft*lb/in.	15.5 (3.5)	2.47 (0.20)

¹ Values in parenthesis are standard deviations.

Table 4. HIPS Mechanical Properties (F900 - T16)

		XZ Orientation ¹	ZX Orientation ¹
Tensile Properties: ASTM D638			
Yield Strength	MPa	25.7 (0.20)	22.7 (0.41)
	psi	3730 (29)	3300 (59)
Elongation @ Yield	%	1.5 (0.014)	1.5 (0.036)
Strength @ Break	MPa	19.1 (0.44)	21.2 (1.3)
	psi	2770 (63)	3070 (191)
Elongation @ Break	%	10.0 (1.2)	2.2 (0.95)
Modulus (Elastic)	GPa	1.99 (0.015)	1.93 (0.019)
	ksi	289 (2.1)	279 (2.7)
Flexural Properties: ASTM D790, Procedure A			
Peak Stress	MPa	52.2 (0.58)	42.0 (1.0)
	psi	7570 (84)	6100 (150)
Flex Yield Strain	%	4.4 (0.12)	3.1 (0.15)
Modulus	GPa	2.17 (0.030)	1.83 (0.042)
	ksi	315 (4.4)	265 (6.1)
Impact Properties: ASTM D256, ASTM D4812			
Notched	J/m	67.6 (3.2)	39.1 (5.2)
	ft*lb/in.	1.27 (0.059)	0.732 (0.097)
Unnotched	J/m	374 (97)	102 (11)
	ft*lb/in.	7.01 (1.8)	1.91 (0.21)

¹ Values in parenthesis are standard deviations.

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