

# HP 3D High Reusability (HR) PA 12 W

with the HP Jet Fusion 5600 Series 3D Printing Solution



Data courtesy of Invent Medical

**HP 3D High Reusability PA 12 W—Ideal for engineering-grade, white, quality functional production parts**

**Quality white parts**

- Produce functional white parts with optimal mechanical properties
- Get consistent performance while achieving up to 75% surplus powder reusability<sup>1</sup>
- Optimize cost and quality—white functional parts and industry-leading reusability<sup>2</sup>

**Strong, functional complex parts**

- Robust thermoplastic produces high-density parts with balanced property profiles and strong structures
- Ideal for white parts like prosthetics, medical equipment, lighting décor, fashion and wearables, and household appliances

**Engineered for HP Multi Jet Fusion technology**

- Designed for production of white functional parts across a variety of industries, including healthcare and consumer goods
- Provides the best balance between white performance and reusability<sup>3</sup>
- Engineered to produce functional prototypes with fine detail and dimensional accuracy

# General properties

	Value	Method
Powder melting point (DSC) (°C / °F)	188 / 370	DIN EN ISO 11357
Particle size (µm)	57	DIN EN ISO 8130/13
Bulk density of powder (g/cm <sup>3</sup> / lb/in <sup>3</sup> )	0.435 / 0.015	ISO 60

# Mechanical properties

This table shows the values that were obtained for HP 3D HR PA 12 W the HP Jet Fusion 5600 Series 3D Printing Solution with the Balanced PA 12 W print profile and Type I tensile specimens, following the ASTM D638 standard.

HP 3D HR PA 12 W <sup>i,ii,iii</sup>	Axis	Average value	Method
Tensile Strength (MPa) <sup>iv</sup>	XY	49	ASTM D638
	Z	45	
Tensile Modulus (MPa)	XY	1900	ASTM D638
	Z	1850	
Elongation at Yield (%)	XY	11	ASTM D638
	Z	8	
Elongation at Break (%)	XY	17	ASTM D638
	Z	9	
Impact strength (kJ/m <sup>2</sup> ) <sup>v</sup>	XY	4.5	ASTM D256
	Z	4.4	
Density (g/cm <sup>3</sup> )	XY	1.02	ASTM D792
	Z	1.02	

i. Based on internal testing and measured using the "HP Half\_Commercial\_Datasheet\_Job". Results may vary with other jobs and geometries.  
 ii. Using HP 3D HR PA 12 W, 25% refresh ratio, Balanced print profile, natural cooling, and measured after bead-blasting with glass beads at 5-6 bars.  
 iii. Following all HP-recommended printer setup and adjustment processes and printheads aligned using semi-automatic procedure  
 iv. Tensile strength typical variation (95% of parts) falls within the 40-51 MPa range, while tensile modulus values remain within the 1700 to 2050 MPa range.  
 v. Using the Izod test method A with notched @ 3.2 mm specimen according to the ASTM D256 standard.

# Dimensional capabilities

Testing was performed for HP 3D HR PA 12 W with a 25% refresh ratio using the Balanced print profile, natural cooling, and measured after bead-blasting with glass beads at 5-6 bars.

This table shows the dimensional tolerances obtained during the characterization for a target process capability of Cpk = 1.33 (4 sigma).

Tolerances for C <sub>pk</sub> = 1.33 <sup>ii,iii</sup> (in mm)	Nominal dimension					
	0 - 30 mm		30 - 50 mm		50 - 80 mm	
	XY	Z	XY	Z	XY	Z
With the general dimensional profile for the HP Jet Fusion 5600 3D Printing Solution	±0.20	±0.42	±0.25	±0.50	±0.30	±0.67

i. Based on internal testing and measured using the HP dimensional capability characterization job. Results may vary with other jobs and geometries.  
 ii. Using HP 3D HR PA 12 W material, 25% refresh ratio, Balanced PA 12 W print profile, natural cooling, and measured after bead-blasting with glass beads at 5-6 bars.  
 iii. Following all HP-recommended printer setup and adjustment processes and printheads aligned using semi-automatic procedure.

This table shows the dimensional tolerances obtained during the characterization of the Test Job for target process capability of  $C_{pk} = 1.00$  (3 sigma).

Tolerances for $C_{pk} = 1.00$ (in mm)	Nominal dimension					
	0 - 30 mm		30 - 50 mm		50 - 80 mm	
	XY	Z	XY	Z	XY	Z
With the general dimensional profile for the HP Jet Fusion 5600 3D Printing Solution	±0.18	±0.34	±0.20	±0.40	±0.26	±0.52

i. Based on internal testing and measured using the HP dimensional capability characterization job. Results may vary with other jobs and geometries.  
 ii. Using HP 3D HR PA 12 W material, 25% refresh ratio, Balanced PA 12 W print profile, natural cooling, and measured after bead-blasting with glass beads at 5-6 bars.  
 iii. Following all HP-recommended printer setup and adjustment processes and printheads aligned using semi-automatic procedure

## Color properties

This table shows the color variability results obtained by  $\Delta E$  (CMC).

	$\Delta E$	Test Method
Printed new part color consistency <sup>i</sup>	3.5	CI64 X-Rite, 14mm, aperture F2, 10°C
Printed part color after weathering test <sup>ii</sup>	3.5	ASTM G154/ASTM D4329

i. The  $\Delta E$  between part CIELAB coordinates and HP white reference:  $l^*=80.647$ ,  $b^*=1.866$ . The parts consist of solid and hollow cubes, printed with different powder lots and advanced powder generations under default settings. Parts thinner than 1.5mm may exhibit higher localized color variation.  
 ii. The  $\Delta E$  between a new part and the part after accelerated weathering test (conducted according to ASTM G154/ASTM D4329 standards: 8h under UV at 60°C + 4h condensation at 50°C, repeated up to 1000h). 4AA8-265EEW. March 2023.

As a reference for color  $\Delta E$ , HP Jet Fusion 5600 Series 3D Printing Solution is on par to the industry benchmark set by:

- Injection molding
  - Molded plastic typically requires  $\Delta E=3.5-5$  between new and aged parts. Weathering test on parts printed on HP MJF technology resulted in a maximum color  $\Delta E=3.5$
  - Injection molding raw material specification is  $\Delta E=1$ , and HP 3D HR PA 12 W fresh powder lots show comparable color variability to injection pellets.
- In the paper industry, color stability specifications between lots are typically  $\Delta E=2$  for standard quality paper and  $\Delta E=1$  for higher quality paper.

## Ordering information\*

Product number	Material
6J0B2A	HP 3D HR PA 12 W 300L/130 kg Production Material
6M032A	HP 3D HR PA 12 W 300L/130 kg Production Material
6M033A	HP 3D HR PA 12 W 1400L/600 kg Material

\*Compatible with the HP Jet Fusion 5400 Series 3D Printing Solution and the HP Jet Fusion 5600 Series 3D Printing Solution.

## Safety datasheet\*

Product number	Link to Safety Datasheet
6J0B2A	<a href="#">HP 3D HR PA 12 W 300L/130 kg Production Material</a>
6M032A	<a href="#">HP 3D HR PA 12 W 300L/130 kg Production Material</a>
6M033A	<a href="#">HP 3D HR PA 12 W 1400L/600 kg Material</a>

\*The link provided refer to US English version of the Safety Datasheet.

Other country specific Safety Datasheets are available [here](#).

If you need more information please contact your HP AM representative.

1. HP Jet Fusion 3D Printing Solutions using HP 3D High Reusability PA 12 W provide up to 75% powder reusability ratio, producing functional parts batch after batch. For testing, material is aged in real printing conditions and powder is tracked by generations (worst case for reusability). Parts are then made from each generation and tested for mechanical properties and accuracy.
2. Based on using recommended packing densities and compared to selective laser sintering (SLS) technology, offers excellent reusability without sacrificing mechanical performance. Tested according to ASTM D638, ASTM D256, ASTM D790, and ASTM D648, and using a 3D scanner. Testing monitored using statistical process controls.
3. Compared to selective laser sintering (SLS) technology. Tested according to ASTM D638, ASTM D256, ASTM D790, and ASTM D648.

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