

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

with the HP Jet Fusion 5400 Series 3D Printing Solution



Data Courtesy of Castomade

**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 in the HP Jet Fusion 5400 Series 3D Printing Solution with the Balanced print profile and Type I tensile specimens<sup>1</sup>.

HP 3D HR PA 12 W <sup>ii,iii</sup>	Axis	Average value	Method
Tensile Strength (MPa) <sup>iv</sup>	XY	49	ASTM D638
	Z	45	
Tensile Modulus (MPa) <sup>iv</sup>	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	4.8	ASTM D638
	Z	4.1	
Density (g/cm <sup>3</sup> )	XY	1.01	ASTM D792
	Z	1.01	

- i. Based on internal testing and measured using the "HP\_Half\_Commercial\_Datasheet\_Job.job". Data provided from 8 jobs on 3 different printers. Results may vary with other jobs and geometries.
- ii. 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.
- 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 45-55 MPa range, while tensile modulus values remain within the 1650 to 2200 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.

The table below shows the dimensional tolerances obtained during the characterization for a target process capability of  $Cpk = 1.33$  (4 sigma)<sup>1</sup>.

Tolerances for $C_{pk}$ = 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 5420W 3D Printing Solution	±0.20	±0.42	±0.25	±0.50	±0.30	±0.67

This table shows the dimensional tolerances if the process capability target is set to  $C_{pk} = 1.00$  (3 sigma)<sup>1</sup>.

Tolerances for $C_{pk} = 1.00$ <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 5420W 3D Printing Solution	±0.18	±0.34	±0.20	±0.40	±0.26	±0.52

<sup>i.</sup> Based on internal testing and measured using the "Dimesnional\_profiler\_EH\_V5 job". Data provided from 8 jobs on 3 different printers. Results may vary with other jobs and geometries.  
<sup>ii.</sup> Using HP 3D HR PA 12 W material, 25% refresh ratio, Balanced W print profile, natural cooling, and measured after bead-blasting with glass beads at 5-6 bars.  
<sup>iii.</sup> Following all HP-recommended printer setup and adjustment processes and printheads aligned using semi-automatic procedure

## Color properties

This table displays the results of color variability obtained through  $\Delta E$  (CIE 2000)

	$\Delta E$	Test Method
Printed new part color consistency*	2.4	CIE64 X-Rite, 14mm, aperture F2, 10o
Printed part color after weathering test**	3.5	ASTM G154/ASTM D4329

<sup>\*</sup>The  $\Delta E$  between part CIELAB coordinates and HP white reference:  $L^*=86.769, a^*=-1.74, b^*=-3.19$ . The parts were printed with different powder lots and different powder generations.  
<sup>\*\*</sup>The  $\Delta E$  between a new part and the part after accelerated weathering test performed under standard ASTM G154/ASTM D4329 (8h under UV @60oC+4h Condensation @50oC, repeated up to 1000h).

As a reference for color  $\Delta E$ , the HP Jet Fusion 5400 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 MJF printed parts resulted in a maximum color  $\Delta E=3.5$
  - Injection molding raw material specification is  $\Delta E=1$ , and HP HR 3D PA 12 W fresh powder lots show comparable color variability to injection pellets.
- The paper industry will typically require a color stability specification between lots of  $\Delta E=2$  for standard quality paper, and  $\Delta E=1$  for higher quality.

## 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.