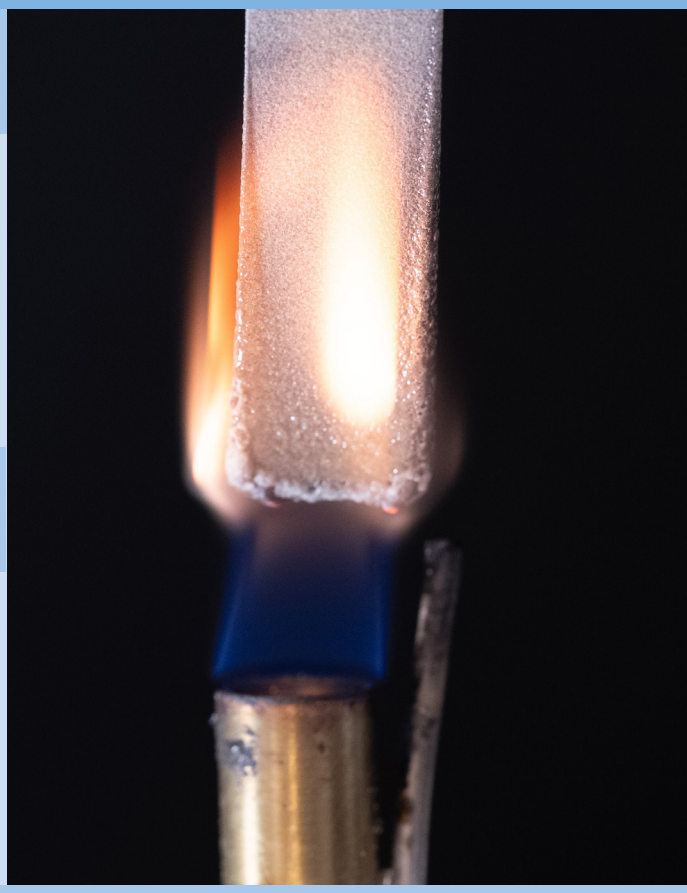
HP 3D High Reusability (HR) PA 12 FR, enabled by Evonik

Halogen-free Flame Retardant (FR) material with 50% reusability,[1] disruptive cost per part,[2] and smooth surface finish.[3]

Flame Retardant

Halogen-free material,[4] UL94 certified.[5]

- Made with halogen-free chemicals.[4]
- Achieves UL94 V0 flammability safety standard at 2.5 mm thickness.[5]
- PA12 particles encapsulated with FR particles provide homogenous flammability across parts.



50% reusability[1]

Maximize powder efficiency with a 50% reusability ratio.[1]

- Disruptive cost per part: Reduce variable cost per part and your total cost of ownership.[2]
- Minimize waste while balancing performance and reusability.
- Reduced carbon footprint: Manufactured using renewable energy sources and biomethane for polymer production.[6]

Premium quality

Produce quality parts with premium surface aesthetics.

- Smooth surface: Achieve premium surface aesthetic parts directly from the printer that are up to 60% smoother.[7]
- Isotropic properties: Produce functional prototypes and final parts with fine detail and dimensional accuracy across a variety of applications.

General properties

Reusability	50%

	Value	Unit	Method
Part density	1.13	g/cm^3	ASTM D792
Melting temperature	187	°C	DSC analysis
Powder melting point (DSC)	187 / 369	°C / °F	ASTM D3418
Particle size	55	µm	ASTM D3451
Bulk density of powder	0.47 / 0.017	g/cm^2 / lb/in^3	ASTM D1895

Mechanical properties[8]

	Orientation	Value	Unit	Method
Tensile Strength[9]	XY	46	MPa	ASTM D638
	Z	46		
Tensile Modulus[10]	XY	2580	MPa	ASTM D638
	Z	2540		
Elongation at Break[11]	XY	4.7	%	ASTM D638
	Z	4		
Elongation at Yield	XY	3.8	%	ASTM D638
	Z	3.6		
Izod Impact Notched[12]	XY	2.8	kJ/m^2	ASTM D256
	Z	2.7		
Heat Deflection Temperature 0.45 MPa	XY	172	°C	ASTM D648
	Z			
Heat Deflection Temperature 1.82 MPa	XY	97	°C	ASTM D648
	Z			
Ball pressure	XY and Z	165	°C	IEC 60695

Electrical properties

	Orientation	Value	Unit	Method
Comparative Tracking Index (CTI)	XY	408	V	ASTM D3638
	Z	423		
Dielectric Strength (Conditioning 48 h / 23 ºC / 50% RH)	XY	7.6	kV/mm	ASTM D149
	Z	6.7		
Dielectric Strength (Conditioning 96 h / 35 ºC / 90% RH)	XY	2.5	kV/mm	ASTM D149
	Z	1.9		
Volume Resistivity at 23 ºC / 50% RH	XY	4.96E+13	Ω•cm	ASTM D257
	Z	5.71E+13		
Surface Resistivity at 23 ºC / 50% RH	XY	9.74E+14	Ω	ASTM D257
	Z	1.03E+15		

Flammability properties

		UL 94 (Blue Card available)			High-Current Arc Ignition (HAI)			Hot Wire Ignition (HWI)		
Thickness	Orientation	Value	Unit	Method	Value	Unit	Method	Value	Unit	Method
1 mm	XY and Z	HB	Pass	UL 94	PLC 0	Pass	UL 746A	PLC 4	Pass	UL 746A
2.5 mm	XY and Z	V0	Pass		PLC 0	Pass		PLC 0	Pass	

		Glow Wire Flammability Index (GWFI)			Glow Wire Ignition Test (GWIT)		
Thickness	Orientation	Value	Unit	Method	Value	Unit	Method
Please reach out to an HP representative for test results.							

Testing done with independent, accredited testing institutes establishes that HP 3D HR PA 12 FR, enabled by Evonik, meets the requirements for:

Railway	Thickness	Value	Unit	Method
R22	1.5 mm	HL2	Pass	EN 45545-2
	1.5 mm to 10 mm	HL1		
R23	1.5 mm to 10 mm	HL2	Pass	
R24	1.5 mm to 10 mm	HL2	Pass	

1. HP Jet Fusion 5600 Series 3D Printing Solutions using HP 3D High Reusability PA 12 FR, enabled by Evonik, provide 50% 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 internal testing and public data for solutions on market as of January, 2024. Cost analysis based on: standard solution configuration price, supplies price, and maintenance costs recommended by manufacturer. Cost criteria: printing 2 full build chambers of parts per week over 1 year of 41 cm3 parts at 8% packing density on Balanced print mode using HP 3D High Reusability PA 12 FR material on HP Jet Fusion 5600 Series 3D Printing Solutions, and the powder reusability ratio recommended by manufacturer, and printing under certain build conditions and part geometries.
3. Compatible with HP Jet Fusion 5600 Series 3D Printing Solutions.
4. This flame retardant is non-halogenated according to IEC 61249-2-21, based on Evonik material composition as of September, 2024.
5. Based on testing done by UL and reported on UL blue card on January, 2025.
6. Based on carbon emissions calculations comparing HP 3D HR PA 12 FR, enabled by Evonik material with a theoretical version of the same material manufactured with non-renewable energy sources.
7. Based on internal HP testing for Linear Surface roughness (Ra). HP tested 5 copies using HP 3D HR PA 12, enabled by Evonik and HP 3D HR PA 12 FR, enabled by Evonik (both using Balanced print mode) with the HP Jet Fusion 5600 series 3D Printing Solution and post processed with sandblasting. Tested all 5 faces of the printed part.
8. Based on internal testing and measured using the "HP Half_Commercial_Datasheet_Job" and 2 material lots following material quality control quidelines. Results may vary with other geometries, jobs, material lots, and material conditions. Using HP 3D HR PA 12 FR, enabled by Evonik, Balanced print profile, natural cooling, and measured after bead-blasting with glass beads at 5-6 bars. Following all HP-recommended printer setup and adjustment processes and printheads aligned. Tensiles measured within 40h to 170h of being printed.
9. 95% of measured tensiles show Tensile Strength above 38 Mpa.
10. 95% of measured tensiles show Modulus values between 2250 to 2850 MPa.
11. 95% of measured tensiles show Elongation at Break in XY-direction above 3.5% and Elongation at Break in Z-direction above 3%.
12. Using the Izod test method A with notched at 3.2 mm specimen according to the ASTM D256 standard.

XXXX-XXXXENW, February 2025