Data Sheet

Nylon 12 / PA 12 (SLS)

Alternative Designations

Polyamide 12

Key Features

Good impact strength • Tough • Can be slightly flexed without fracture • High thermal resistance • Biocompatible

Description

Nylon PA 12 is one of the most popular 3D printing materials. It has good mechanical properties such as toughness, tensile strength and impact strength. This material can also be flexed without fracture. It has a melting point of 176°C with low water absorption. It is broadly used for sterilized films for packaging materials in the food and pharmaceutical fields.

Mechanical Properties

Tensile modulus	1650 MPa
Tensile strength	48 MPa
Elongation at break	15 – 20%
Flexural strength	41 MPa
Flexural modulus	1.73 GPa

Thermal Properties

Melting temperature (20°C/min)	176°C
Heat deflection temperature (1.80 MPa)	70°C
Heat deflection temperature (0.45 MPa)	154°C
Softening temperature	155°C

Physical Properties

Density	0.93 g/cm^3

Reference

Datasheets provided by Xometry contain materials sourced through trusted OEMs, material distributors, and databases. Please visit Materialdatacenter.com for further information on this material.

Data Sheet

Nylon 12 / PA 12 (MJF)

Alternative Designations

Polyamide 12

Key Features

Good impact strength • Tough • Can be slightly flexed without fracture • High thermal resistance • Biocompatible

Description

Nylon PA 12 is one of the most popular 3D printing materials. It has good mechanical properties such as toughness, tensile strength and impact strength. This material can also be flexed without fracture. It has a melting point of 176°C with low water absorption. It is broadly used for sterilized films for packaging materials in the food and pharmaceutical fields.

Mechanical Properties

Tensile modulus	1800 MPa
Tensile strength	48 MPa
Elongation at break	15 – 20%
Flexural strength	65 MPa
Flexural modulus	1.73 GPa

Thermal Properties

Melting temperature (20°C/min)	187°C
Heat deflection temperature (1.80 MPa)	95°C
Heat deflection temperature (0.45 MPa)	175°C
Softening temperature	155°C

Physical Properties

Density	1.01 g/cm^3

Reference

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Data Sheet

Nylon 12 / PA 12 (FDM)

Alternative Designations

Polyamide 12

Key Features

Mechanical resilience • Impact and fatigue resistant • Tough • Chemical resistant

Description

It is a versatile, strong, and durable thermoplastic. It is frequently used in the production of 3D printed parts and products. Nylon 12 has a wide range of applications, including in the automotive, aerospace, and medical industries. It also possesses low coefficient of friction. However, rough surfaces are produced due to the initial powdery state of nylon.

Mechanical Properties

Tensile modulus	1250 – 1510 MPa
Tensile strength	41.8 – 49.3 MPa
Elongation at break	6.5 – 30%
Flexural strength	54.5 – 56.5 MPa
Flexural modulus	1.20 – 1.26 GPa
Hardness (Shore D)	75

Thermal Properties

Melting temperature (20°C/min)	172 – 180°C
Heat deflection temperature (1.80 MPa)	75.3 – 84.3°C
Heat deflection temperature (0.45 MPa)	91.9 – 94.7°C
Softening temperature	163°C

Physical Properties

Density	1.01 g/cm^3

Reference

Datasheets provided by Xometry contain materials sourced through trusted OEMs, material distributors, and databases. Please visit Materialdatacenter.com for further information on this material.

HP 3D High Reusability PA 12

Strong, lowest cost,[1] quality parts

Produce strong, functional, detailed complex parts

- Robust thermoplastic produces high-density parts with balanced property profiles and strong structures.
- Provides excellent chemical resistance to oils, greases, aliphatic hydrocarbons, and alkalies.[2]
- Ideal for complex assemblies, housings, enclosures, and watertight applications.
- Biocompatibility certifications—meets USP Class I-VI and US FDA guidance for Intact Skin Surface Devices.[3]

Quality at the lowest cost per part[1]

- Achieve the lowest cost per part[1] and reduce your total cost of ownership.[4]
- Minimize waste—reuse surplus powder batch after batch and get functional parts, no throwing away anymore.[5]
- Get consistent performance while achieving 80% surplus powder reusability.[6]
- Optimize cost and part quality—cost-efficient material with industry-leading surplus powder reusability.[5]

Engineered for HP Multi Jet Fusion technology

- Designed for production of functional parts across a variety of industries.
- Provides the best balance between performance and reusability.[7]
- Achieves watertight properties without any additional post-processing.
- Engineered to produce final parts and functional prototypes with fine detail and dimensional accuracy.

Picture taken after graphite post-processing

For more information, please visit
hp.com/go/3DMaterials

Technical specifications[8]

Category	Measurement	Value	Method
General properties	Powder melting point (DSC)	187 °C/369 °F	ASTM D3418
	Particle size	60 µm	ASTM D3451
	Bulk density of powder	0.425 g/cm^3	ASTM D1895
	Density of parts	1.01 g/cm^3	ASTM D792
Mechanical properties	Tensile strength, max load[9], XY	48 MPa/6960 psi	ASTM D638
	Tensile strength, max load[9], Z	48 MPa/6960 psi	ASTM D638
	Tensile modulus[9], XY	1700 MPa/247 ksi	ASTM D638
	Tensile modulus[9], Z	1800 MPa/261 ksi	ASTM D638
	Elongation at break[9], XY	20%	ASTM D638
	Elongation at break[9], Z	15%	ASTM D638
	Flexural strength (@ 5%)[10], XY	65 MPa/9425 psi	ASTM D790
	Flexural strength (@ 5%)[10], Z	70 MPa/10150 psi	ASTM D790
	Flexural modulus[10], XY	1730 MPa/251 ksi	ASTM D790
	Flexural modulus[10], Z	1730 MPa/251 ksi	ASTM D790
	Izod impact notched (@ 3.2 mm, 23ºC), XYZ	3.5 kJ/m^2	ASTM D256 Test Method A
Thermal properties	Heat deflection temperature (@ 0.45 MPa, 66 psi), XY	175 ºC/347 ºF	ASTM D648 Test Method A
	Heat deflection temperature (@ 0.45 MPa, 66 psi), Z	175 ºC/347 ºF	ASTM D648 Test Method A
	Heat deflection temperature (@ 1.82 MPa, 264 psi), XY	95 ºC/203 ºF	ASTM D648 Test Method A
	Heat deflection temperature (@ 1.82 MPa, 264 psi), Z	106 ºC/223 ºF	ASTM D648 Test Method A
Recyclability	Refresh ratio for stable performance	20%	
Certifications	USP Class I-VI and US FDA guidance for Intact Skin Surface Devices, RoHS[11], EU REACH, PAHs		

Ordering Information

	HP 3D High Reusability PA 12	HP 3D High Reusability PA 12 Bundle 12 units	HP 3D High Reusability PA 12
Product Number	V1R10A	V1R15A	V1R16A
Weight	13 kg	156 kg	130 kg
Capacity	30L[12]	360L[12]	300L[12]
Dimensions (xyz)	600 x 333 x 302 mm	600 x 333 x 302 mm	800 x 600 x 1205 mm
Compatibility	HP Jet Fusion 3D 4210/4200/3200 Printing Solution	HP Jet Fusion 3D 4200 Printing Solution	HP Jet Fusion 3D 4210/4200 Printing Solution

Eco Highlights

- Powders and agents are not clas azardous[13]
- Cleaner, more comfortable workplace—enclosed printing system, and automatic powder management[14]
- Minimizes waste due to industry-leading reusability of powder[15]

Find out more about HP sustainable solutions at hp.com/ecosolutions

1. Based on internal testing and public data, HP Jet Fusion 3D printing solution average printing cost per part on the HP Jet Fusion 3D 4200 Printing Solution is half the cost of comparable fused deposition modeling (FDM) and selective laser sintering (SLS) printer solutions from $100,000 USD to $300,000 USD, when averaged together and not taken individually, in market as of April 2016. Cost analysis based on: standard solution configuration price, supplies price, and maintenance costs recommended by the manufacturer. Cost criteria: printing 1-2 buckets per day/5 days per week over 1 year of 30-gram parts at 10% packing density using the powder reusability ratio recommended by the manufacturer.
2. Tested with diluted alkalies, concentrated alkalies, chlorine salts, alcohol, ester, ethers, ketones, aliphatic hydrocarbons, unleaded petrol, motor oil, aromatic hydrocarbons, toluene, and DOT 3 brake fluid.
3. Based on HP internal testing, June 2017, HP 3D600 Fusing and Detailing Agents and HP 3D High Reusability PA 12 powder meet USP Class I-VI and US FDA's guidance for Intact Skin Surface Devices. Tested according to USP Class I-VI including irritation, acute systemic toxicity, and implantation; cytotoxicity per ISO 10993-5, Biological evaluation of medical devices–part 5: Tests for in vitro cytotoxicity; and sensitization per ISO 10993-10, Biological evaluation of medical devices–Part 10: Tests for irritation and skin sensitization. It is the responsibility of the customer to determine that its use of the fusing and detailing agents and powder is safe and technically suitable to the intended applications and consistent with the relevant regulatory requirements (including FDA requirements) applicable to the customer's final product. For more information, see www.hp.com/go/biocompatibilitycertificate/PA12.
4. Compared to selective laser sintering (SLS) and fused deposition modeling (FDM) technologies, HP Multi Jet Fusion technology can reduce the overall energy requirements needed to attain full fusing and reduce the system requirements for large, vacuum-sealed ovens. In addition, HP Multi Jet Fusion technology uses less heating power than SLS systems for better material properties and material reuse rates, minimizing waste.
5. 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 and MFI test using HDT at different loads with a 3D scanner for dimensional stability. Testing monitored using statistical process controls. Liters refers to the materials container size and not the actual materials volume. Materials are measured in kilograms.
6. HP Jet Fusion 3D printing solutions using HP 3D High Reusability PA 12 provide 80% post-production surplus powder reusability, producing functional parts batch after batch. For testing, material is aged in real printing conditions and powder is tracked by generations (worst case for recyclability). Parts are then made from each generation and tested for mechanical properties and accuracy.
7. Compared to selective laser sintering (SLS) technology. Tested according to ASTM D638 and MFI test.
8. The following technical information should be considered representative of averages or typical values and should not be used for specification purposes. These values refer to a balanced print mode with FW BD5.
9. Test results realized under the ASTM D638 with a test rate of 50mm/min, specimens type V.
10. Test results realized under ASTM D790 Procedure B at a test rate of 13.55 mm/min.
11. RoHS certification for EU, Bosnia-Herzegovina, China, India, Japan, Jordan, Korea, Serbia, Singapore, Turkey, Ukraine, Vietnam.
12. Liters refers to the materials container size and not the actual materials volume. Materials are measured in kilograms.
13. The HP powder and agents do not meet the criteria for classification as hazardous according to Regulation (EC) 1272/2008 as amended.
14. Compared to manual print retrieval process used by other powder-based technologies. The term "cleaner" does not refer to any indoor air quality requirements and/or consider related air quality regulations or testing that may be applicable.
15. Compared to PA 12 materials available as of June, 2017. HP Jet Fusion 3D printing solutions using HP 3D High Reusability PA 12 provide 80% post-production surplus powder reusability, producing functional parts batch after batch.

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This is an HP Indigo digital print.