



# LaserForm<sup>®</sup> AlSi12 (B)

Aluminum alloy fine-tuned for use with ProX DMP 200 and 300 metal 3D printers for production of lightweight components with good thermal properties.

LaserForm AlSi12 (B) is formulated and fine-tuned specifically for 3D Systems' ProX<sup>®</sup> DMP 200 and 300 metal 3D printers to deliver highest part quality and best part properties. The print parameter database that 3D Systems provides together with the material has been extensively developed, tested and optimized in 3D Systems' part production facilities that hold the unique expertise of printing 500,000 challenging production parts, year over year in a large variety of materials. And for 24/7 production, 3D Systems' thorough Supplier Quality Management System guarantees consistent, monitored material quality for reliable process results.

## Material Description

Known for its high strength-to-weight ratio and good thermal properties, the lightweight LaserForm AlSi12 (B) is frequently used in aerospace, aviation, motorsports and automotive applications as well as for specifically thin-walled applications such as the production of heat exchangers. With Direct Metal Printing, parts that were typically cast are now being directly printed. Even more complex designs than typical casting processes allow can be produced in one single piece using DMP.

## Classification

The chemical composition of LaserForm AlSi12 (B) conforms to the requirements of ISO 18273, ISO 17672, UNS A94047 and DIN EN 1706 specifications and is indicated in the table below in wt%.

## Mechanical Properties<sup>1,2</sup>

MEASUREMENT	CONDITION	METRIC		U.S.	
		AS-BUILT	STRESS RELIEF	AS-BUILT	STRESS RELIEF
Youngs modulus <sup>3</sup> (GPa   ksi)					
Horizontal direction - XY		70 ± 5	65 ± 10	10150 ± 750	9430 ± 1500
Vertical direction - Z		65 ± 5	60 ± 5	9430 ± 750	8760 ± 750
Ultimate strength <sup>3</sup> (MPa   ksi)	ASTM E8M				
Horizontal direction - XY		470 ± 30	340 ± 30	68 ± 4	49 ± 4
Vertical direction - Z		490 ± 10	340 ± 10	71 ± 2	49 ± 2
Yield strength Rp0.2% <sup>3</sup> (MPa   ksi)	ASTM E8M				
Horizontal direction - XY		290 ± 20	220 ± 20	42 ± 3	32 ± 3
Vertical direction - Z		260 ± 10	210 ± 10	38 ± 2	30 ± 2
Elongation at break <sup>3</sup> (%)	ASTM E8M				
Horizontal direction - XY		8 ± 2	12 ± 2	8 ± 2	12 ± 2
Vertical direction - Z		6 ± 2	10 ± 2	6 ± 2	10 ± 2
Hardness, Brinell HBW2,5/62,5	ISO 6506-1	97 ± 13	115 ± 5	97 ± 13	115 ± 5

## Thermal Properties<sup>4</sup>

MEASUREMENT	CONDITION	METRIC	U.S.
Thermal conductivity (W/(m.K)   Btu/(h.ft <sup>2</sup> .°F))	at 50°C / 120 °F	130-150	75-87
CTE - Coefficient of thermal expansion (µm/(m.°C)   µ inch/(inch. °F))	in the range of 20 to 600 °C	20	11
Melting range (°C   °F)		573-585	1060-1090

<sup>1</sup> Parts manufactured with standard parameters on a ProX DMP 200

<sup>2</sup> Values based on average and double standard deviation

<sup>3</sup> Tested on ASTM E8M specimen with circular cross sections

<sup>4</sup> Values based on literature



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## Electrical Properties<sup>1</sup>

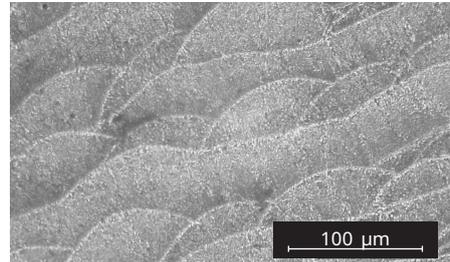
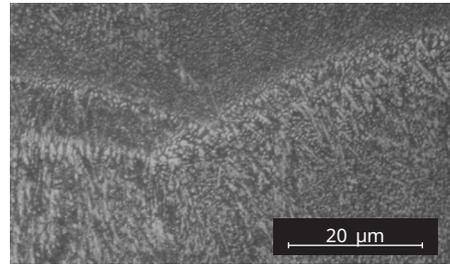
MEASUREMENT	METRIC	U.S.
Electrical resistivity (nΩ.m   nΩ.in)	45-62	1771-2440

## Physical Properties

MEASUREMENT	METRIC	U.S.
Density		
Relative, based on pixel count <sup>2</sup> (%)	>99	>99
Absolute theoretical <sup>1</sup> (g/cm <sup>3</sup>   lb/in <sup>3</sup> )	2.685	0.097

## Chemical Composition

ELEMENT	% OF WEIGHT
Al	Balance
Si	11.0 - 13.0
Residuals	< 0.6



Microstructures after stress release



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<sup>1</sup> Values based on literature

<sup>2</sup> Parts manufactured with standard parameters on a ProX DMP 200