LaserForm® Ni625 (A)

Ni625 fine-tuned for use with ProX® DMP 320 metal printer producing industrial parts with high heat resistance, high strength and high corrosion resistance. LaserForm Ni626 (A) is especially resistant to crevice and pitting corrosion.

LaserForm Ni625 (A) is formulated and fine-tuned specifically for 3D Systems DMP 320 metal 3D Printers to deliver high part quality and consistent 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 metal production parts in various materials year over year. And for your 24/7 production 3D Systems' thorough Supplier Quality Management System guarantees consistent, monitored material quality for reliable results.

Material Description

Ni625 is known for its combination of high strength and excellent corrosion resistance. LaserForm Ni625 (A) is the ideal material for industries where these two strengths need to come together: chemical, marine, aerospace and nuclear industry. Applications include: reaction vessels, tubing, heat exchangers, valves, engine exhaust systems, turbine seals, propeller blades, submarine fittings, propulsion motors, reactor core and control-rod components in nuclear water reactors.

Classification

The chemical composition of LaserForm Ni625 (A) corresponds to ASTM F3056, UNS N06625, Werkstoff Nr. 2.4856, DIN NiCr22Mo9Nb and AMS 5666 and is indicated in the table below in wt%.

Mechanical Properties[1,2]

MEASUREMENT	CONDITION	METRIC			U.S.		
		AS-BUILT	AFTER STRESS RELIEF	AFTER LOW SOLUTION ANNEAL	AS-BUILT	AFTER STRESS RELIEF	AFTER LOW SOLUTION ANNEAL
Ultimate strength (MPa | ksi)	ASTM E8M						
Horizontal direction - XY Vertical direction - Z		1040 ± 20 1030 ± 20	1110 ± 60 1050 ± 30	1030 ± 20 980 ± 20	150 ± 3 150 ± 3	160 ± 9 153 ± 5	150 ± 3 142 ± 3
Yield strength Rp0.2% (MPa | ksi)	ASTM E8M						
Horizontal direction - XY Vertical direction - Z		770 ± 30 730 ± 20	750 ± 60 700 ± 40	640 ± 20 600 ± 20	110 ± 5 105 ± 3	110 ± 9 100 ± 6	93 ± 3 87 ± 3
Elongation at break (%)	ASTM E8M						
Horizontal direction - XY Vertical direction - Z		22 ± 2 33 ± 1	19 ± 3 23 ± 3	27 ± 3 34 ± 3	22 ± 2 33 ± 1	19 ± 3 23 ± 3	27 ± 3 34 ± 3
Reduction of area (%)							
Vertical direction – Z	ASTM E8M	30 ± 2	26 ± 2	31 ± 1	30 ± 2	26 ± 2	31 ± 1
Hardness, Rockwell C	ASTM E18	29 ± 3	32 ± 3	28 ± 4	29 ± 3	32 ± 3	28 ± 4
Impact toughness[3] (J | ft-lb)	ASTM E23	NA	NA	84 ± 7	NA	NA	62 ± 5

Thermal Properties[4]

MEASUREMENT	CONDITION	METRIC	U.S.
Thermal conductivity (W/(m.K) | Btu/(h.ft².°F))	at 21 °C / 70 °F	9.8	5.7
CTE - Coefficient of thermal expansion (µm/(m.°C) | µ inch/(inch . °F))	at 93 °C / 200 °F at 538°C / 1000°F at 871°C/1600°F	12.8 14.0 15.8	7.1 7.8 8.8
Melting range (°C | °F)		1290 - 1350	2355 - 2465

[1] Parts manufactured with standard parameters on a ProX DMP 320, Config B
[2] Values based on average and standard deviation
[3] Tested with Charpy V-notch impact test specimens type A at room temperature
[4] Values based on literature
NA = Not available

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Physical Properties

MEASUREMENT	METRIC	U.S.
	AS BUILT AND AFTER STRESS RELIEF	
Density		
Relative, based on pixel count[1] (%)	>99,9	>99,9
Absolute theoretical[4] (g/cm³ | lb/in³)	8.44	0.305

Surface Quality[1]

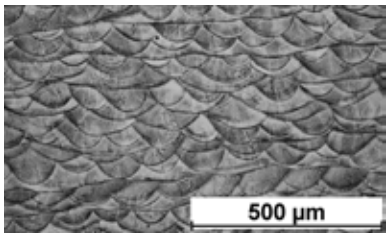
MEASUREMENT	METRIC		U.S.	
	AS BUILT	SAND BLASTED	AS BUILT	SAND BLASTED
Surface Roughness R_a				
Horizontal direction (XY) (µm | µin)	4 - 7	1 - 4	160 - 275	40 - 160
Vertical direction (Z) (µm | µin)	8 - 11	4 - 7	320 - 433	160 - 275

Chemical Composition

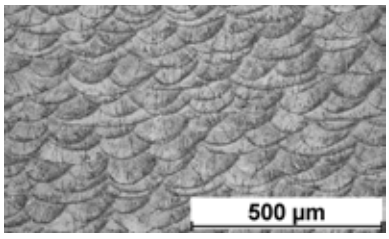
The chemical composition of LaserForm Ni625 (A) corresponds to UNS N06625, Werkstoff Nr. 2.4856, DIN NiCr22Mo9Nb and AMS5 5666 and is indicated in the table below in wt%.

ELEMENT	% OF WEIGHT
Ni	≥ 58.00
Cr	20.00 - 23.00
Mo	8.00 - 10.00
Fe	≤ 5.00
Co	≤1.00
Nb	3.15 - 4.15
Ta	≤ 0.05
Ti	≤ 0.40
Al	≤ 0.40
Cu	≤ 0.50
Mn	≤ 0.50

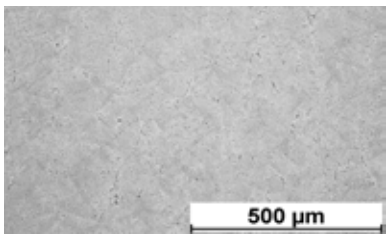
[1] Parts manufactured with standard parameters on a ProX DMP 320, Config B
[4] Values based on literature



Microstructure as built



Microstructure after stress relief



Microstructure after low solution anneal

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PN 10103A 03-17