LaserForm® Ni625 (A)

Ni625 (A) is fine-tuned for use with DMP Flex/Factory 350 Dual and DMP Flex 350 Triple metal printers producing industrial parts with high heat resistance, high strength strength and high corrosion resistance. LaserForm Ni625 (A) is especially resistant to crevice and pitting corrosion.

Ni625 (A) is formulated and fine-tuned 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 more than 1,000,000 challenging metal production parts in various materials year over year. Based on a multitude of test samples, the properties listed below provide high confidence to the user in terms of job-to-job and machine-to-machine repeatability. Using the LaserForm material enables the user to experience consistent and reliable part quality.

Material Description

Ni625 (A) 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.

Mechanical Properties[1,2,3]

MEASUREMENT	CONDITION	METRIC			U.S.		
		NHT	SR	LSA	NHT	SR	LSA
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[4] (J | ft-lb)	ASTM E23	NA	NA	84 ± 7	NA	NA	62 ± 5

Thermal Properties[5]

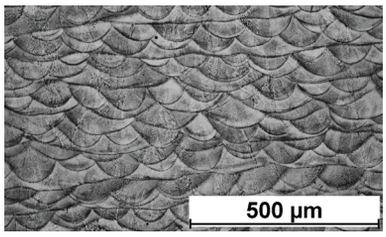
MEASUREMENT	CONDITION	METRIC	U.S.
Thermal conductivity (W/(m.K) | Btu.in/(h.ft².°F))	at 21 °C / 70 °F	9.8	68
CTE - Coefficient of thermal expansion (µm/(m.°C) | µ in/(in . °F))	at 93 °C / 200 °F at 538°C / 1000°F at 871°C/1600°F	12.8 14.0 15.8	7.1 7.8 8.8
Melting range (°C | °F)		1290 - 1350	2355 - 2465

[1] Parts manufactured with standard parameters on a ProX DMP 320, Config B. Values also indicative for DMP Flex/Factory 350 Dual and DMP Flex 350 Triple
[2] Values based on average and standard deviation
[3] NHT refers to non-heat treated sample condition, SR refers to a stress-relief, LSA refers to a low-solution annealing
[4] Tested with Charpy V-notch impact test specimens type A at room temperature
[5] Values based on literature
NA = Not available

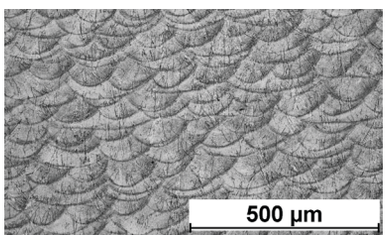
Physical Properties

DENSITY	TEST METHOD	METRIC	U.S.
Theoretical density (g/cm^3 | lb/in^3)	Value from litterature	8.44	0.305
Relative density[1] (%)	Optical method	>99,9	>99,9

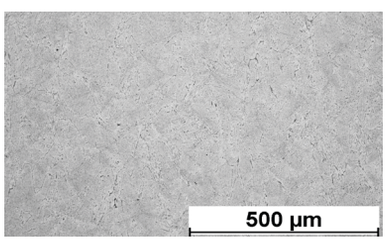
SURFACE ROUGHNESS R_A [1]	METRIC		U.S.	
	AS BUILT	SAND BLASTED	AS BUILT	SAND BLASTED
Horizontal direction (XY) (µm | µin)	4 - 7	1 - 4	160 - 275	40 - 160
Vertical direction (Z) (µm | µin)	8 - 11	4 - 7	320 - 433	160 - 275



Microstructure NHT



Microstructure after SR



Microstructure after LSA

Chemical Composition

Parts built with LaserForm Ni625 (A) have a chemical composition that complies with ASTM F3056, UNS N06625, Werkstoff Nr. 2.4856, DIN NiCr22Mo9Nb and AMS5 5666.

ELEMENT	% OF WEIGHT
Ni	Bal.
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
C	≤ 0.10
P	≤ 0.015
S	≤ 0.015
Si	≤ 0.50