

UniJet 17-4PH Stainless Steel

For Desktop Metal Shop Pro binderjet printing, 75 µm layers

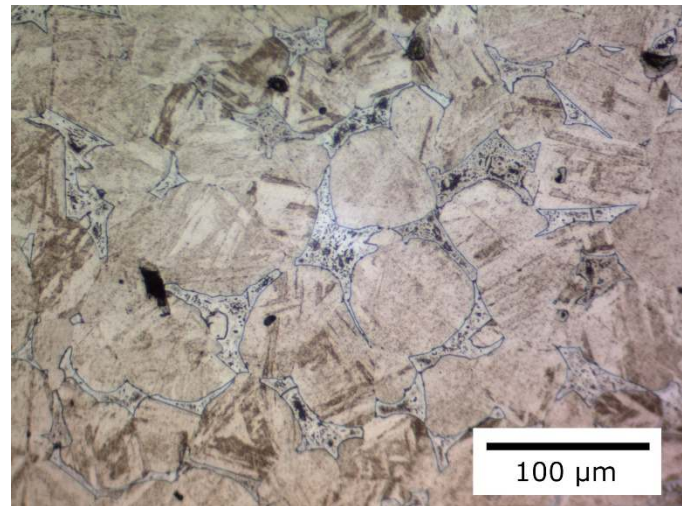
Chemical Composition

Element	Fe [wt.-%]	Cr [wt.-%]	Ni [wt.-%]	Cu [wt.-%]	C [wt.-%]	Mn [wt.-%]	Si [wt.-%]	Nb+Ta [wt.-%]	S [wt.-%]	P [wt.-%]
Min	Bal.	15.0	3.0	3.0	0.0	0.0	0.0	0.15	0.0	0.0
Max	Bal.	17.5	5.0	5.0	0.07	1.0	1.0	0.45	0.03	0.04

Powder/Print Properties

Tap Density (typical)	5.33 ± 0.05 g/cm ³
Brown Density ^{1,2}	4.49 ± 0.05 g/cm ³
Sintered Density ^{2,3}	7.68 ± 0.03 g/cm ³

Sintering Shrinkage ⁴	
X	15.17% +/- 0.65%
Y	15.66% +/- 0.65%
Z	18.18% +/- 0.63%



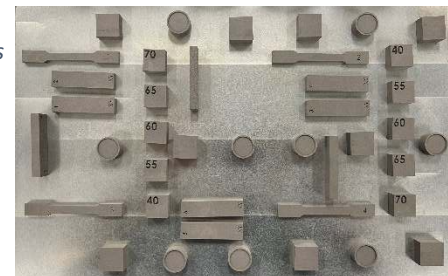
Geometric Tolerance

Absolute geometric tol (95% confidence) ^{2,4}	X	0.65mm in 100mm
Absolute geometric tol (95% confidence) ^{2,4}	Y	0.65mm in 100mm
Absolute geometric tol (95% confidence) ^{2,4}	Z	0.63mm in 100mm

Surface Roughness, Ra

XY	5-6 µm
XZ	7-9 µm

Bed of green parts



Mechanical Properties

Coupon Type: ASTM E8/E8-M Rectangular Tension Test Specimens, Subsize (25mm gauge), no polishing

	UL Printed As Sintered	MIM - MPIF 35 min As Sintered	UL Printed H900 Heat Treat	MIM - MPIF 35 min H900 Heat Treat
Yield Strength (MPa)	663±30	650	1064±58	970
Ultimate Strength (MPa)	1002±30	790	1260±41	1070
Elongation (%)	8±1	4	10±1	4

Remarks:

- 1) Tolerance provided is 1 standard deviation, inclusive of printer process variation, variation in bed density, printer-to-printer variation, powder variation, brown density variation, curing variation, and environmental factors deviation, when process is performed within stated specifications. Brown density variation on a single print, given to 1 standard deviation, is +/- 0.025 g/cm³.
- 2) Material performance measurements are impacted by factors including part geometry and instrumentation error.
- 3) Tolerance provided is 1 standard deviation, inclusive of printer process variation, printer variation, powder variation, brown density variation, curing variation, environmental factors deviation, and furnace variation, assuming a gas-sealed furnace capable of temperature uniformity of +/- 5°C and sintered under atmospheric pressure of flowing Ar-3%H₂ gas with burnout hold and peak temp hold of 2 hours at 1310C, when process is performed within stated specifications. Furnaces capable of superior process control will yield superior consistencies and average densities to those reported here.
- 4) tolerance is provided to 2 standard deviations, inclusive of printer process variation, printer variation, powder variation, brown density variation, curing variation, environmental factors deviation, and furnace variation, when process is performed within stated specifications
- 5) Materials properties stated in the table above have been determined on the basis of ASTM E8/E8-M and therein cited norms on binder jet printed and sintered bars with process surface.