

### Introduction

PowderRange metal Additive Manufacturing powders from Carpenter Additive are developed with the needs of the busy AM facility in mind.

- ▶ Easy ordering
- ▶ Standard specifications
- ▶ 24-hour shipment
- ▶ Sold in easy-to-handle multiples of 10 kgs
- ▶ Easy repeat orders to optimize inventory management

This leaves you free to concentrate on the design and build of your AM parts, confident that PowderRange metal AM powders from Carpenter Additive will add reliability and consistency to your AM built parts.

### Characteristics

PowderRange 718 Nickel Alloy is a nickel-based, age-hardenable material with significant alloying contributions from chromium, iron, niobium, and molybdenum. The alloy combines excellent mechanical properties over a large range of temperatures and excellent corrosion resistance. PowderRange 718 preserves its high mechanical properties up to 704°C (1300°F).

PowderRange 718S is a highly processable nickel superalloy, due to good phase stability, minimal segregation and low crack susceptibility. The latter two are in part due to Carpenter Additive's tight control on residual elements. Although PowderRange 718S is precipitation hardenable, it still displays excellent mechanical properties in the 'as processed' state. PowderRange 718S is available in a low residual element grade that emphasizes control of interstitial type elements to improve mechanical properties

### Applications

PowderRange 718S Nickel Alloy is suitable in applications that require advanced mechanical properties in a range of temperatures. Specifically, aerospace and nuclear industries.

### Chemical composition

Element		Minimum wt%	Maximum wt%
Al	Aluminum	0.30	0.70
B	Boron		0.006
Ca	Calcium		0.01
C	Carbon	0.02	0.08
Cr	Chromium	17.00	21.00
Co	Cobalt		1
Cu	Copper		0.3
Fe	Iron	Balance	
Mg	Magnesium		0.01
Mn	Manganese		0.35
Mo	Molybdenum	2.8	3.3
Ni	Nickel	50.00	55.00
Nb + Ta	Niobium + Tantalum	4.75	5.5
N	Nitrogen		0.03
O	Oxygen		0.03
P	Phosphorus		0.015
Se	Selenium		0.005
Si	Silicon		0.15
Ti	Titanium	0.75	1.15

### Particle size distribution – CT PowderRange 718 S

Size	Value	Method
-15 µm	10 Volume %	Laser Size Diffraction
+45 µm	15 Weight %	Sieve Analysis
D10	10-18 µm	Laser Size Diffraction
D50	26-28 µm	Laser Size Diffraction

### Mechanical properties (indicative only)

Property		As built	After Heat Treatment
Tensile Strength [1]	Horizontal Direction (XY)	998 - 1100 MPa 145-160 ksi	1200 - 1300 MPa 174-189 ksi
	Vertical Direction (Z)	804 - 1030 MPa 117-149 ksi	1150 - 1250 MPa 167-181 ksi
Yield Strength [1]	Horizontal Direction (XY)	709 - 830 MPa 103-120 ksi	900 - 1000 MPa 131-145 ksi
	Vertical Direction (Z)	568 - 684 MPa 82-99 ksi	900 - 1000 MPa 131-145 ksi
Young's Modulus [1]	Horizontal Direction (XY)	108 - 178 GPa 16-26 Msi	155 - 175 GPa 22- 25 Msi
	Vertical Direction (Z)	114 - 134 GPa 17-19 Msi	155 - 175 GPa 22-25 Msi
Elongation [1]	Horizontal Direction (XY)	22 - 32 %	10 - 14%
	Vertical Direction (Z)	12 - 28 %	10 - 14%
Hardness [2]		319 - 344 HV0.5	420 - 440 HV0.5
Coefficient of Thermal Expansion [3]	14 × 10 <sup>-6</sup> m/mK		
Thermal Conductivity [3]	10 - 12 W/mK		

1. Mechanical testing in accordance with ISO 6892
2. Hardness test in accordance with ASTM E384-11
3. In the range of 20°C (68°F) to 100°C (212°F)

Range of mechanical properties encompasses expected values across multiple machine platforms.

### Similar materials

Company	Alternative Title
LPW	718 Nickel Alloy
UNS	N07718
Other Generic Names	N/A
3D Systems	Ni718
Concept Laser	CL 100NB
EOS	IN718
Realizer	N/A
Renishaw	In718-0405
SLM Solutions	Inconel 718
TRUMPF	Nickel Alloy 178-A LMF

### Ordering information

PowderRange 718 S is available from stock, dispatched within 24 hours of receipt of order. Our PowderRange metal AM powders are sold in multiples of 10 kgs giving you the flexibility to order just the volume you need to maintain efficient material stock levels.

All our PowderRange materials are supplied with a full metal powder certification to Carpenter Additive's standard material specification, reporting size distribution, flow, chemistry and morphology.

Code	Description	Unit volumes
CT PowderRange 718 S	Standard Laser Powder Bed Fusion metal powder	10 kgs

### Further information

To make an enquiry, please contact [powderrange@carpenteradditive.com](mailto:powderrange@carpenteradditive.com). Alternatively, for EU/Row, call +44 (0)1928 240 530 and for USA call +1-412-788-2856. You can visit us at [www.carpenteradditive.com](http://www.carpenteradditive.com).