

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 174 Stainless Steel is a martensitic precipitation strengthened stainless steel with a combination of high strength, good mechanical properties and good corrosion resistance up to 300°C (572°F).

PowderRange 174 is available as a nitrogen atomized powder product. For users wishing to perform precipitation hardening heat treatments on processed material, it is advised that the argon atomized powder 174AR is used. This is because the increased nitrogen content in nitrogen atomized powder can inhibit the formation for the martensitic phase during the precipitation hardening treatment. For the same reason, it is advised the powder is also processed in an argon atmosphere.

Applications

Widely used throughout multiple industries including aerospace, petrochemical and food processing. Any application where high strength and or corrosion resistance is required at room-intermediate temperatures.

Chemical composition

Element		Minimum wt%	Maximum wt%
C	Carbon		0.07
Cr	Chromium	15.0	17.0
Cu	Copper	3.00	5.00
Fe	Iron	Balance	
Mn	Manganese		1.00
Mo	Molybdenum		1.00
N	Nitrogen		0.1
Nb+Ta	Niobium+Tantalum	0.15	0.45
Ni	Nickel	3.00	5.00
O	Oxygen		0.10
P	Phosphorus		0.040
S	Sulphur		0.030
Si	Silicon		1.00

Particle size distribution – CT PowderRange 174 F

Size	Value	Method
-15 µm	5 Volume %	Laser Size Diffraction
+45 µm	3 Weight %	Sieve Analysis
D10	18-24 µm	Laser Size Diffraction
D50	32.5-34.4 µm	Laser Size Diffraction

Mechanical properties (indicative only)

Property		As built	After Heat Treatment
Tensile Strength [1]	Horizontal Direction (XY)	880 - 980 MPa 127.6- 142.1 ksi	1250 - 1350 MPa 181.3- 195.8 ksi
	Vertical Direction (Z)	910 - 1010 MPa 131.9- 146.5 ksi	1250 - 1350 MPa 181.3- 195.8 ksi
Yield Strength [1]	Horizontal Direction (XY)	536 - 695 MPa 77.7- 100.8 ksi	1150 - 1250 MPa 166.8- 181.3 ksi
	Vertical Direction (Z)	520 - 680 MPa 75.4- 98.6 ksi	1150 - 1250 MPa 166.8- 181.3 ksi
Young's Modulus [1]	Horizontal Direction (XY)	140 - 200 GPa 20.3- 29 Msi	170 - 190 GPa 24.7- 27.6 Msi
	Vertical Direction (Z)	140 - 200 GPa 20.3- 29 Msi	170 - 190 GPa 24.7- 27.6 Msi
Elongation [1]	Horizontal Direction (XY)	25 - 55 %	25 - 30 %
	Vertical Direction (Z)	30 - 70 %	25 - 30 %
Hardness [2]		210 - 250 HV	361 - 406
Coefficient of Thermal Expansion [3]	13 – 15 × 10 ⁻⁶ m/mK		
Thermal Conductivity [3]	13 - 15 W/mK		

1. Mechanical testing in accordance with ISO 6892
2. Vickers hardness measurement (HV) in accordance with ISO 6507
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	174 Stainless Steel
UNS	S17400
Other Generic Names	1.4542; 174-PH
3D Systems	Stainless Steel 17-4 PH
Concept Laser	CL 92PH
EOS	GP1
Realizer	N/A
Renishaw	N/A
SLM Solutions	1.4542 (17-4PH)
TRUMPF	N/A

Ordering information

PowderRange 174 F is available from stock and 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 174 F	Flexible material developed to be suitable for a wide range of powder bed fusion machines and applications	10 kgs

Further information

To make an enquiry, please contact 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.