Datasheet
Copper alloys

Osprey® C18150

Osprey® C18150 is a CuCrZr alloy that offers a combination of strength, conductivity, wear and oxidation resistance. It can withstand service temperatures up to 500°C (932°F).

UNS

C18150

Powder designed for

- Additive Manufacturing (AM)
- Metal Injection Moulding (MIM)

Product description

Osprey® C18150 is a copper chromium zirconium (CuCrZr) alloy that offers a combination of strength, conductivity, wear and oxidation resistance. It can withstand service temperatures up to 500°C (932°F) and is commonly used in, for example, various automotive and space applications, including resistance welding and soldering.

Additive Manufacturing processes, including Laser – Powder Bed Fusion (L-PBF), employ optimized process conditions or even green lasers to safely produce designs with complex internal structures for heat transfer and cooling. Osprey® C18150 is also available as a fine powder for Binder Jetting, as well as for Metal Injection Moulding (MIM).

This metal powder is manufactured by Inert Gas Atomization (IGA), producing a powder with a spherical morphology which provides good flow characteristics and high packing density. In addition, the powder has a low oxygen content and low impurity levels, resulting in a metallurgically clean product with enhanced mechanical performance.

Chemical composition (nominal), %

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Cu	Bal.
Fe	≤0.08
Cr	0.50-1.20
Zr	0.03-0.30
Si	≤0.1
O	≤0.1

Powder characteristics and morphology

Powder for Additive Manufacturing

Osprey® metal powder for Additive Manufacturing is characterized by a spherical morphology and high packing density, which confer good flow properties. For powder bed processes these are essential when applying fresh powder layers to the bed to ensure uniform and consistent part build.

For blown powder processes, such as Direct Energy Deposition (DED), good flow ensures uniform build rates. Tight control of the particle size distribution also helps ensure good flowability. Low oxygen powders result in clean microstructures and low inclusion levels in the finished parts.

Powder for Metal Injection Moulding (MIM)

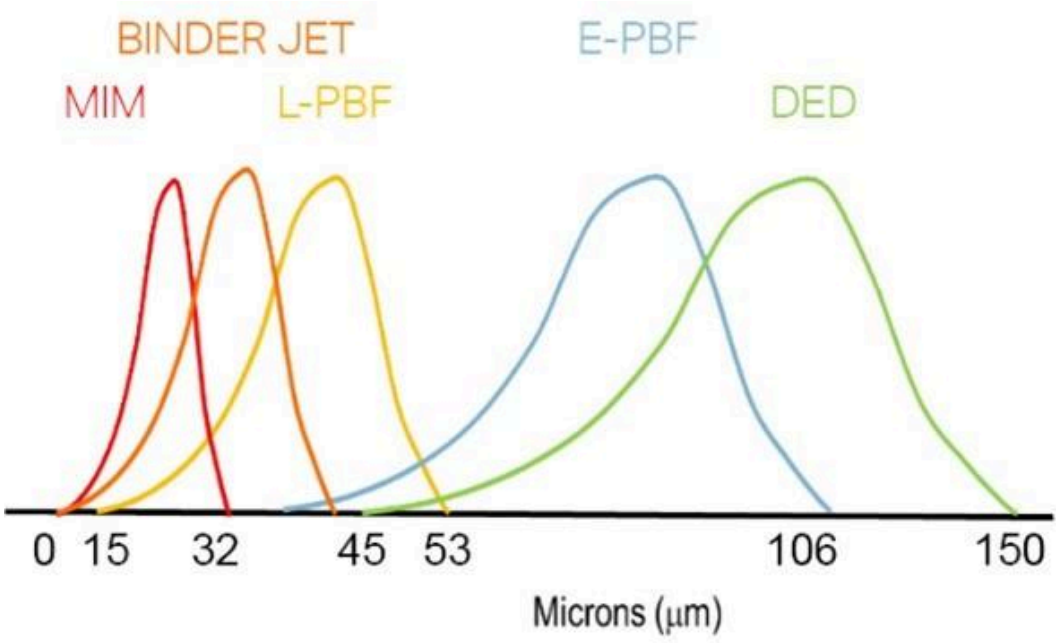
Osprey® MIM powder has a spherical morphology, resulting in high packing density. This enables the manufacture of feedstocks with high powder loading, which not only minimizes binder costs but also reduces part shrinkage during debinding and sintering. Spherical powder also has excellent flow characteristics, resulting in reduced tool wear and consistent mould filling.

Osprey® MIM powder's low oxygen content allows better control of carbon and consistency during sintering. Low oxygen levels, together with high packing density, also facilitate faster sintering.

Particle size distribution

Powder for Additive Manufacturing

Osprey® metal powder for Additive Manufacturing is available in a wide range of particle size distributions that are tailored to the individual Additive Manufacturing systems. They can also be tailored to the particular requirements of the end application, both in terms of mechanical performance and surface finish.



Typical particle size distributions for Additive Manufacturing.

Process technology	Size (µm)
Binder jetting	≤ 16, ≤ 22, ≤ 32, ≤ 38, ≤ 45
Laser - Powder Bed Fusion (L-PBF)	15 to 53 and 10 to 45
Electron beam - Powder Bed Fusion (E-PBF)	45 to 106
Direct Energy Deposition (DED)	53 to 150

Powder for Metal Injection Moulding (MIM)

Osprey® metal powder for Metal Injection Moulding (MIM) is available in a wide range of particle size distributions, from under 5 µm up to 38 µm. The table shows our standard particle size distributions for MIM powders.

Size (µm)	D10 (µm)	D50 (µm)	D90 (µm)
≤ 38	5.5	13.0	31.0
≤ 32	5.0	12.0	29.0

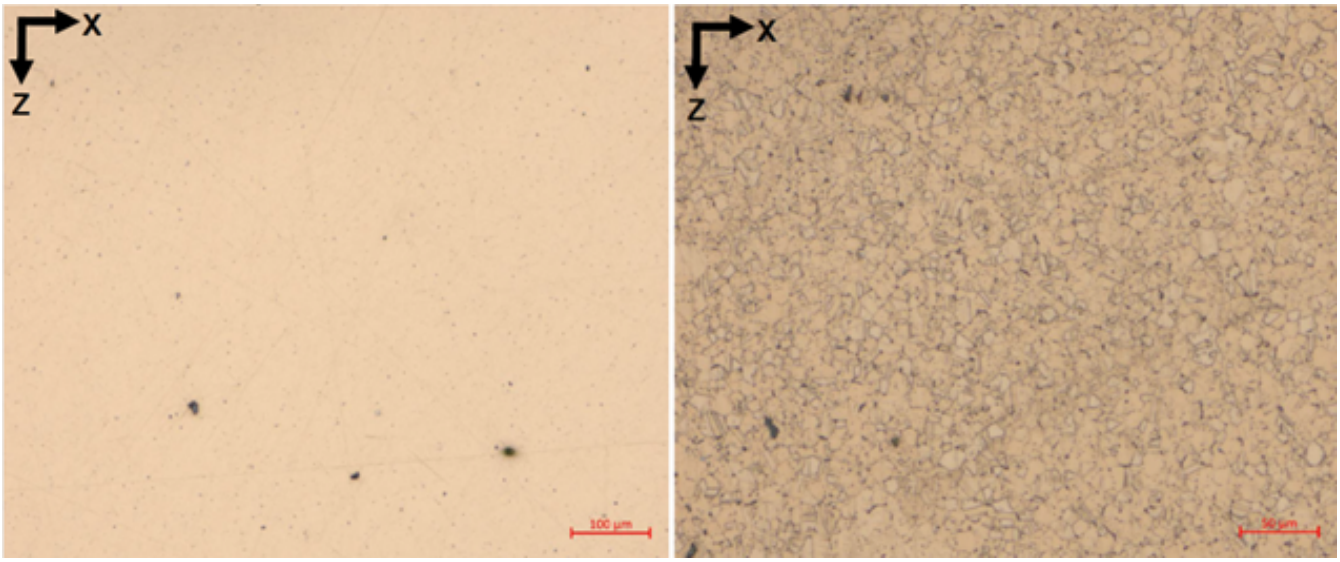
80% ≤ 22	4.5	11.5	27.0
90% ≤ 22	4.0	10.5	22.0
90% ≤ 16	3.5	8.0	16.0

*Particle size measurements performed using a Malvern laser particle size analyzer, typical D10, D50 and D90 provided.

Tailor-made particle size distributions are available on request. Contact us to discuss your specific requirements.

Microstructure

Below are microstructure images of Osprey® C18150. The samples were produced by Binder Jetting (-18 µm) on the Desktop Metal Production System™ P-1 where a relative density over 98% was achieved. The sintered microstructures in as-polished and etched condition are shown below where a low level of porosity is seen and overall a homogenous and fine-grained microstructure.



Micrograph of Osprey® C18150 in a) as-printed and b) etched conditions.

Mechanical properties

Typical mechanical properties for Binder jetting (BJ) printed Osprey® C18150 material evaluated in room temperature in as sintered as well as machined condition. The material is sintered at 1,068°C (1,954°F) followed by solution heat treatment at 980°C (1,796°F)/3h/water quenching and aging at 480°C (896°F)/5h/furnace cooling.

For comparison, typical mechanical properties for Laser – Powder Bed Fusion (L-PBF) is included in the table.

Condition	Yield strength	Tensile strength	Elongation	Hardness, HRB
	Rp0.2	Rm	A	
	MPa	MPa	%	
BJ, as sintered	233 +/- 7	345 +/- 8	28 +/- 4	58
BJ, machined	249 +/- 5	361 +/- 5	26 +/- 3	58
L-PBF, as printed	160	210	40	–
L-PBF, solution annealed and age hardened	210	340	25	–

Condition	Yield strength	Tensile strength	Elongation, %	Hardness, HRB
	Rp0.2	Rm	A	
	ksi	ksi	%	
BJ, as sintered	34 +/- 1	50 +/- 1	28 +/- 4	58
BJ, machined	36 +/- 1	52 +/- 1	26 +/- 3	58
L-PBF, as printed	23	30	40	–
L-PBF, solution annealed and age hardened	30	49	25	–

Physical properties

Wrought material data

- Density: 8.9 g/cm3
- Thermal conductivity: 324 W/mK

Typical application areas

Osprey® C18150 is typically used in the following areas:

- Electrical and electronic components
- Thermal transfer applications
- Space rocket engine and nozzle components

Testing

All Osprey® metal powders are supplied with a certificate of analysis containing information on the chemical composition and particle size distribution. Information on other powder characteristics is available upon request.

Packaging

A wide range of packaging options is available, from 5kgs plastic bottles to 250kg metal drums.

5 kg (11 lbs) Plastic bottles
6 kg (13 lbs) Plastic bottles
10 kg (22 lbs) Plastic bottles
20 kg (44 lbs) Metal cans
100 kg (220 lbs) Steel drums
150 kg (330 lbs) Steel drums
250 kg (551 lbs) Steel drums
All packaging materials are suitable for air, sea and road freight.

Contact us for more information and to discuss your packaging requirements.

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