Datasheet
Copper alloys

Osprey® HC Cu

Osprey® HC Cu is manufactured using high-conductivity copper electrodes and is characterized by high electrical and thermal conductivity.

UNS

C10200

Powder designed for

Additive Manufacturing (AM)
Cold spray
Metal Injection Moulding (MIM)
Micro-MIM

Product description

Osprey® HC Cu is manufactured using high-conductivity copper electrodes and is characterized by high electrical and thermal conductivity. Osprey® HC Cu is typically used to manufacture net-shape electrical conductors and thermal heat exchangers and is particularly suitable for electric vehicles.

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® HC Cu 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	<0.05>
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 Cold spray

Osprey® metal powder forcold spray is characterized by a spherical morphology and good flow properties. Accurate control of the powder composition and particle size distribution ensure consistent performance both throughout a single batch as well as between different batches of the same alloy.

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.

Powder for Micro-MIM

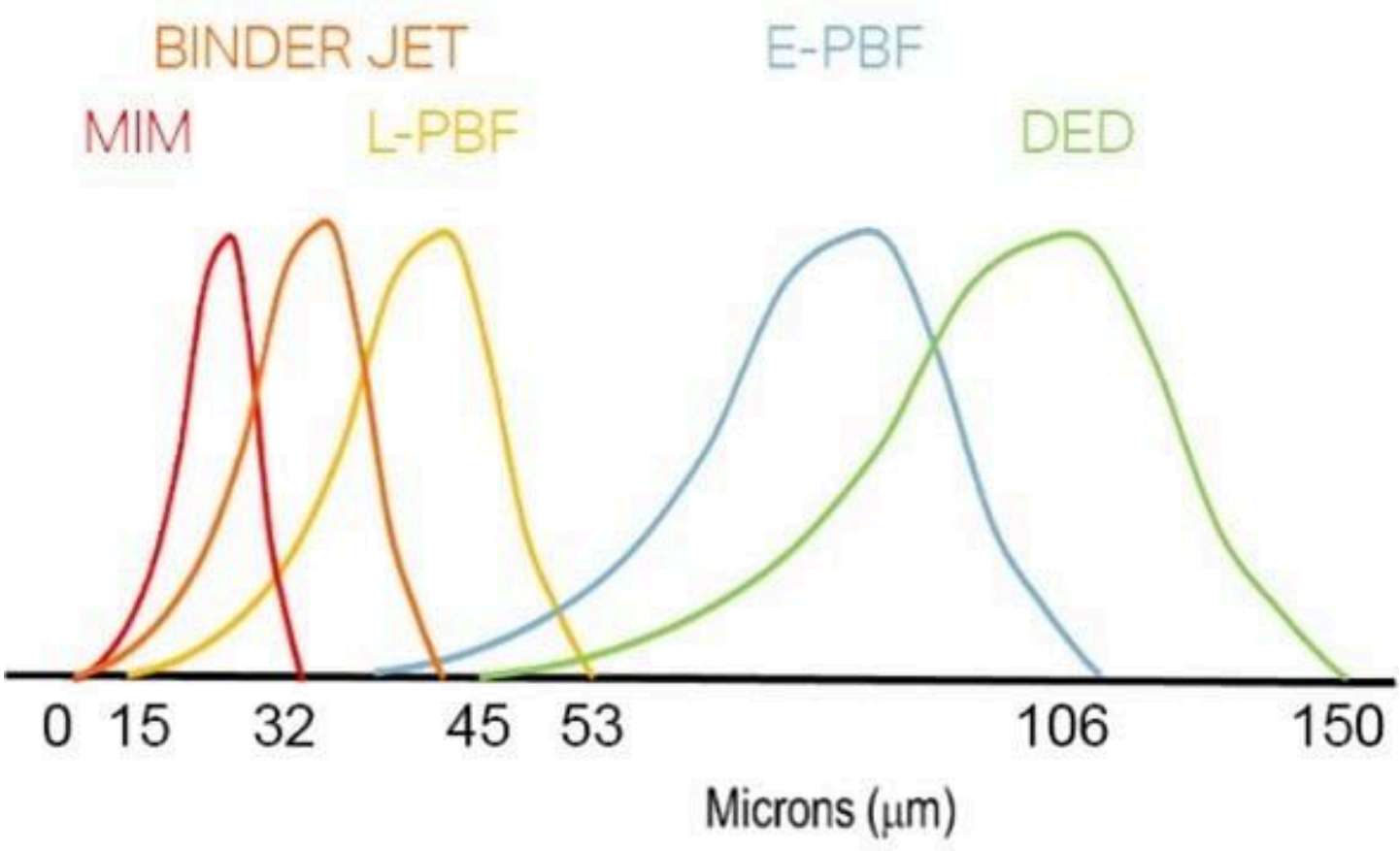
Osprey® Micro-MIM powder has a spherical morphology, resulting in high packing density. This enables the manufacture of feedstocks with high powder loading, which not only minimizes binder costs but also reduces part shrinkage during debinding and sintering. Spherical powder also has excellent flow characteristics,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

Osprey® Micro-MIM powders' low oxygen content allows better control of carbon and consistency during sintering. Low oxygen, together with high packing density, also facilitates 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.



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 Cold spray

Osprey® metal powder for Cold spray is available in a wide range of particle size distributions, from 5 µm to 45 µm. Our standard range of Cold spray powder includes the following particle size distributions:

20 to 45 µm
15 to 38 µm
10 to 32 µm
5 to 25 µm

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.

Powder for Micro-MIM

Osprey® metal powder for Micro-Metal Injection Moulding (Micro-MIM) has the following typical particle size distributions:

	D10 (%)	D50 (%)	D90 (%)
90% – 10 µm	3.0	5.7	9.8
80% – 5 µm	1.9	3.4	6.0

* Particle size measurements performed using a Malvern laser particle size analyzer.

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

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Mechanical properties

Typical mechanical properties for as-built and heat-treated condition for both Laser – Powder Bed Fusion (L-PBF) and Binder jetting (BJ) printed Osprey® HC Cu material, evaluated in room temperature in a heat-treated (in Ar or H), stress-relieved and annealed condition (~1000 °C). Hot Isostatic Pressing (HIP) is often used as an additional step to densify sintered material.

Condition	Yield strength	Tensile strength	Elongation	Eletrical conductivity	Density	Density
	$R_{p0.2}$	R_m	A			
	MPa	MPa	%	% IACS	g/cc	%
L-PBF, as built	160	230	>35	>90	8.7	98
L-PBF, heat treated	120	210	>40	>95	8.8	99
BJ, as sintered	45	175	>20	>85	8.4	94
BJ, heat treated and HIP	50	210	>40	>90	8.8	99
MIM, heat treated	69	207	>30	>85	8.5	96
Condition	Proof strength	Tensile strength	Elongation	Eletrical conductivity	Density	Density
	$R_{p0.2}$	R_m	A			
	ksi	ksi	%	% IACS	lb/ft3	%
L-PBF, as built	23	33	>35	>90	543	98
L-PBF, heat treated	17	30	>40	>95	549	99
BJ, as sintered	6.5	25	>20	>85	524	94
BJ, heat treated and HIP	7.3	30	>40	>90	549	99

MIM, heat treated	10	30	>30	>85	530	96

Physical properties

Wrought material data
Density: 8.9 g/cm3
Thermal conductivity: 398 W/m K

Typical application areas

Osprey® HC Cu is typically used in the following applications:

Heat exchangers
Heat sinks and conductor plate
Electrical conductors and connectors
Induction coils

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.