Datasheet
Duplex stainless steels

Osprey® 2507

Osprey® 2507 is a super-duplex stainless steel with excellent resistance to SCC and very high resistance to pitting and crevice corrosion. It has high resistance to general corrosion and very high mechanical strength.

UNS
S32750

EN Name
X 2 CrNiMoN 25-7-4

EN Number
1.4410

SS
2328

Powder designed for

- Additive Manufacturing (AM)
- Hot Isostatic Pressing (HIP)
- Metal Injection Moulding (MIM)

Product description

Main characteristics of Osprey® 2507

- Excellent resistance to stress corrosion cracking (SCC) in chloride-bearing environments (PRE no. 43)
- Excellent resistance to pitting and crevice corrosion
- High resistance to general corrosion, erosion and corrosion fatigue
- Very high mechanical strength
- Good weldability

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), %

Last updated: Jul 17, 2023 4:01 PM CET

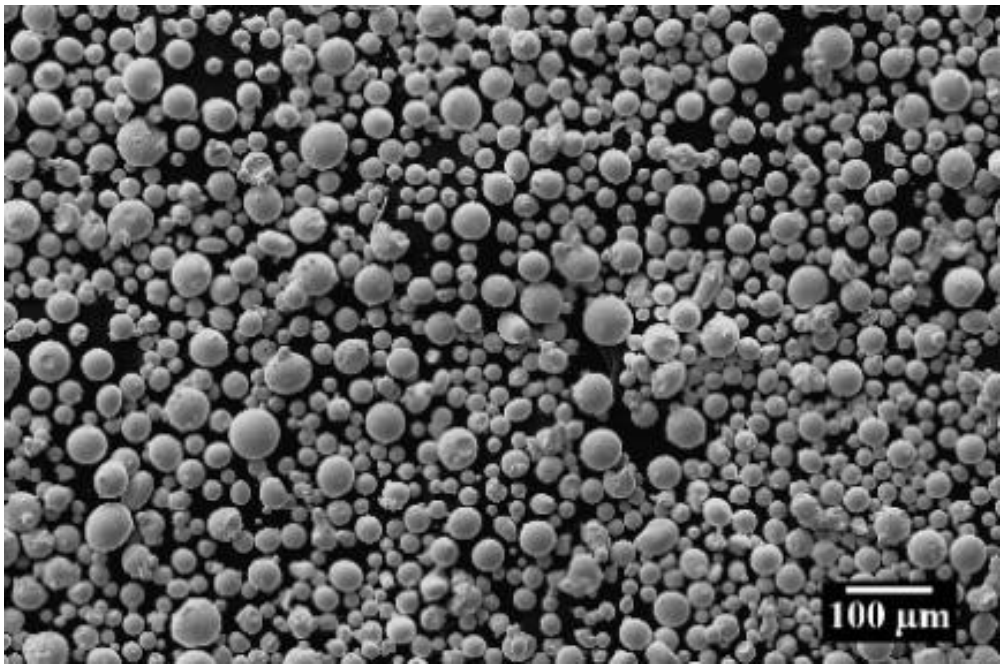
Fe	Bal.
Cr	25
Ni	7
Mo	4
C	≤0.030
Si	≤0.8
Mn	≤1.2
P	≤0.025
S	≤0.015
N	0.3
Other	Cu 0.5

Powder characteristics and morphology

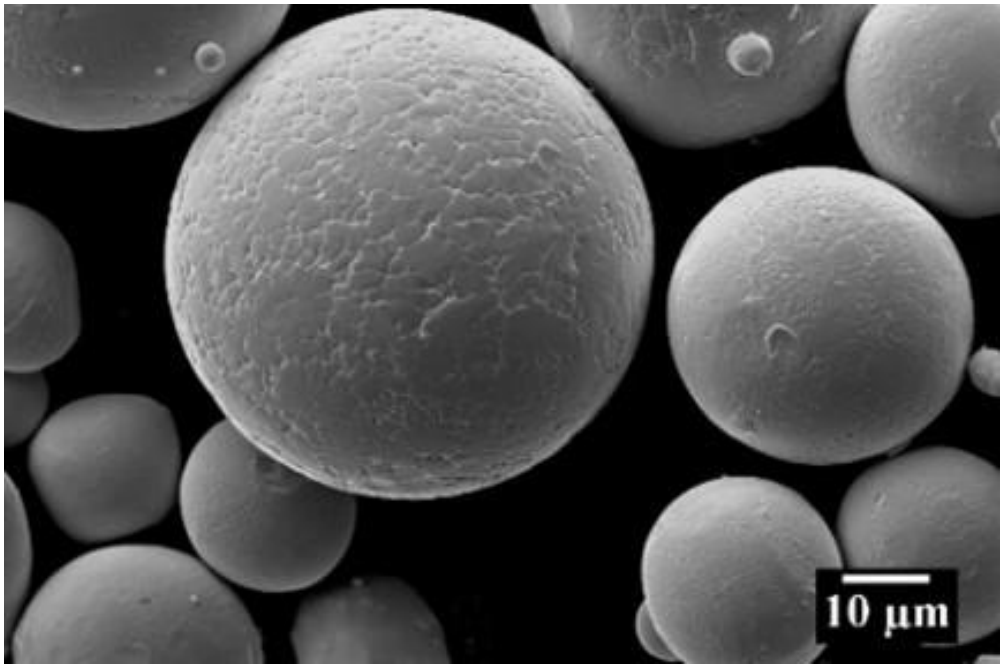
Powder for Additive Manufacturing

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.

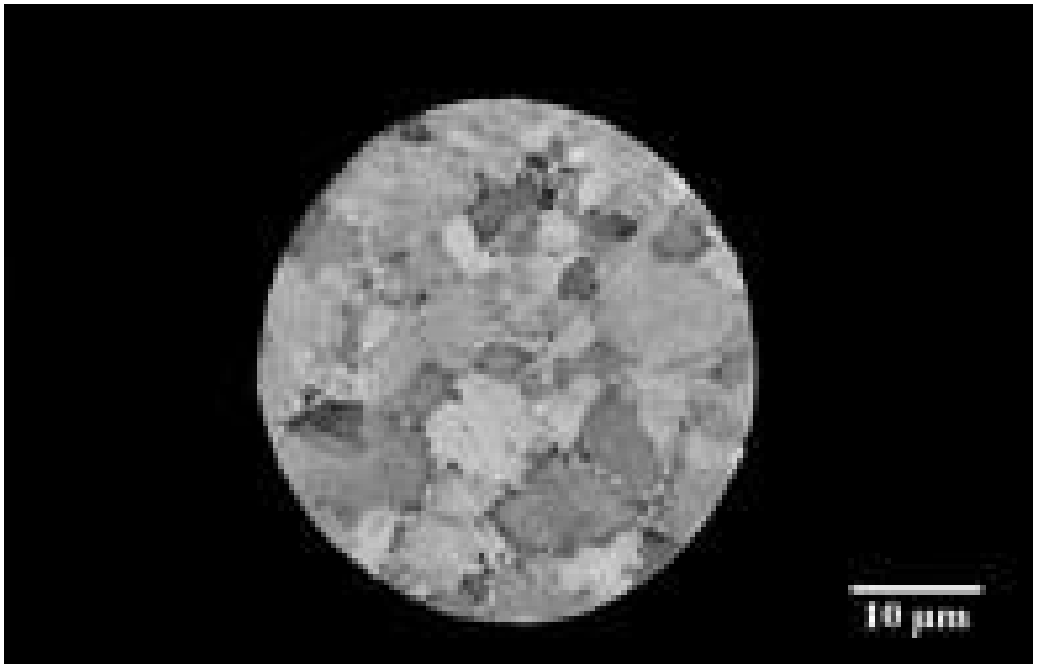
For blown powder processes, such as Direct Energy Deposition (DED), good flow ensures uniform build rates. Tight control of the particle size distribution also helps ensure good flowability. Low oxygen powders result in clean microstructures and low inclusion levels in the finished parts.



-53 +15 µm powder with a spherical morphology -53 +15 µm powder with a spherical morphology,



Smooth surface and low level of powder satellites Smooth surface and low level of powder satellites.



Captions=Powder in cross-section, in back scatted electron mode, highlighting the fine cellular structure Powder in cross-section, in back scatted electron mode, highlighting the fine cellular structure.

Powder for Hot Isostatic Pressing (HIP)

Osprey® HIP powder has a spherical morphology, resulting in 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.

Powder for Metal Injection Moulding (MIM)

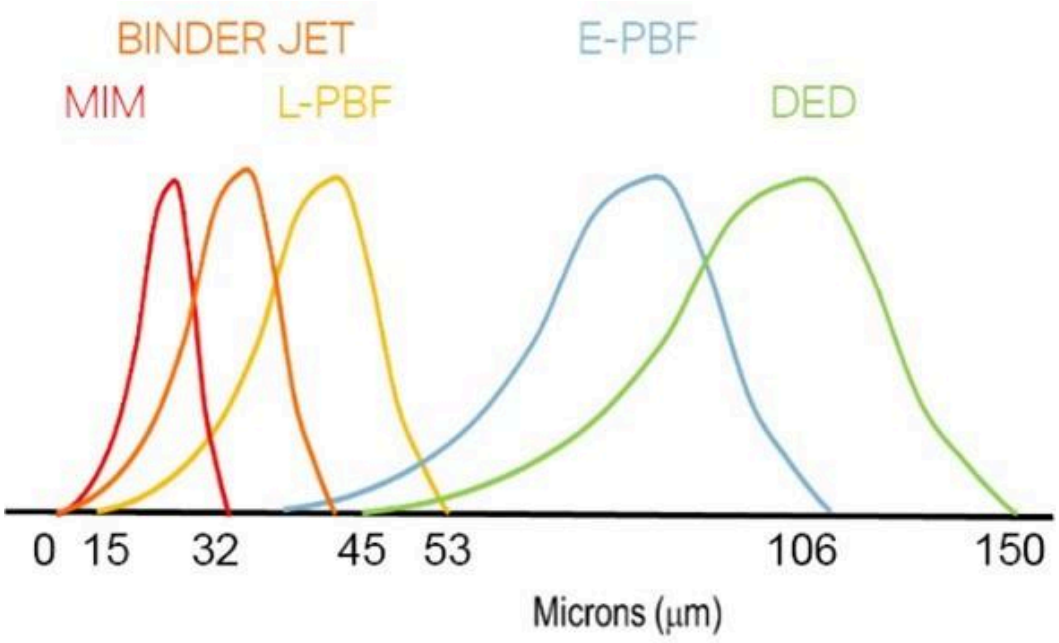
Osprey® MIM powder has a spherical morphology, resulting in high packing density. This enables the manufacture of feedstocks with high powder loading, which not only minimizes binder costs but also reduces part shrinkage during debinding and sintering. Spherical powder also has excellent flow characteristics, 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 Hot Isostatic Pressing (HIP)

Osprey® powder for Hot Isostatic Pressing (HIP) is available in a broad size range, typically <250 microns, resulting in a high packing density and tap density. Low oxygen levels, together with high packing density, also facilitate faster sintering.

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.

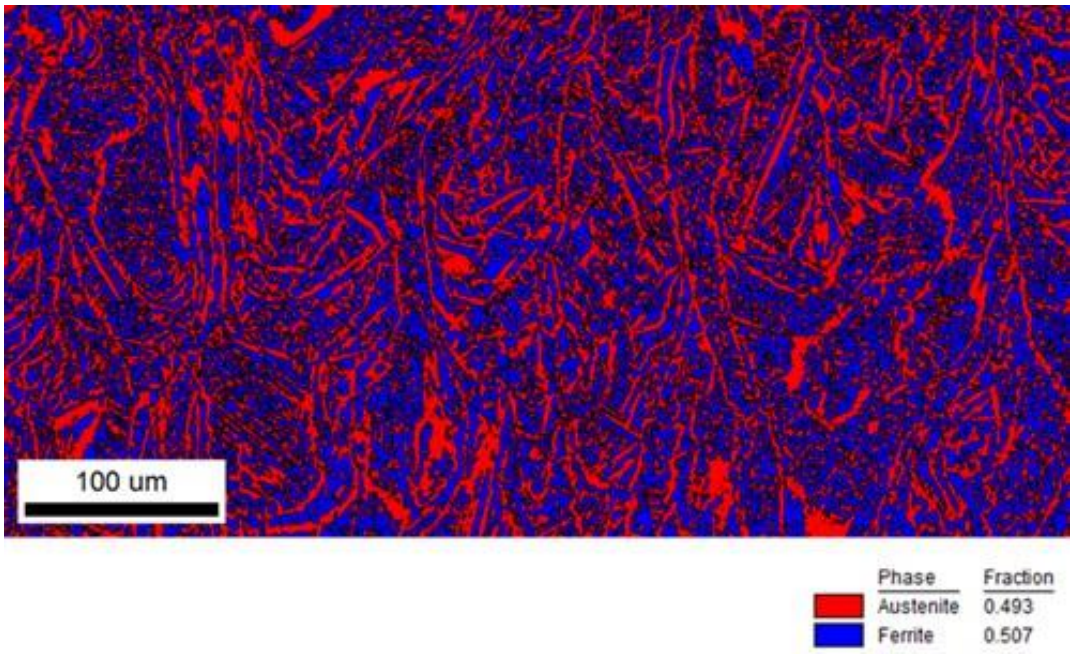
Tailor-made particle size distributions are available on request. Contact us to discuss your specific requirements.

Microstructure

A suitable heat treatment is carried out on the as-built parts in order to achieve the desired austenitic and ferritic microstructure in the final parts. Typically solution annealing between 1,040–1,110 °C (1,904–2,030 °F) followed by air or water cooling is performed.

Micrographs of Osprey® 2507

As-built vertical section of the test specimen with near full dense part with 99.9% + relative density As-built vertical section of the test specimen with near full dense part with 99.9% + relative density.



EBSD image indicating phase balance and microstructure in the material after suitable heat treatment EBSD image indicating phase balance and microstructure in the material after suitable heat treatment.

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Mechanical properties

Typical mechanical properties of material produced by Laser - Powder Bed Fusion (L-PBF) in heat-treated condition.

Direction	Temperature (T), °C	Yield strength (Rp0.2), MPa	Tensile strength (Rm), MPa	E-modulus, GPa	Elongation (A), %
Horizontal	20	627	956	207	39
Vertical	20	626	923	202	43
Horizontal	100	548	878	205	33
Vertical	100	546	854	205	36
Horizontal	200	505	823	196	30
Vertical	200	504	797	195	31
Horizontal	300	517	857	190	30
Vertical	300	505	832	190	31

Direction	Temperature (T), °F	Yield strength (Rp0.2), ksi	Tensile strength (Rm), ksi	E-modulus, ksi	Elongation (A), %
Horizontal	68	90	138	30	39
Vertical	68	90	133	29	43
Horizontal	212	79	127	30	33
Vertical	212	79	123	30	36
Horizontal	392	73	119	28	30
Vertical	392	73	116	28	31
Horizontal	572	74	124	28	30
Vertical	572	73	121	28	31

Direction	Temperature (T), °C	Impact energy (W), J
Horizontal	–50	198
Vertical	–50	235
Horizontal	0	237
Vertical	0	250
Horizontal	20	242
Vertical	20	247

Horizontal	50	248
Vertical	50	263

Direction	Temperature (T), °F	Impact energy (W), Ft-lb
Horizontal	−58	146
Vertical	−58	173
Horizontal	32	174
Vertical	32	184
Horizontal	68	178
Vertical	68	182
Horizontal	122	182
Vertical	122	194

Hardness

Typical Vickers Hardness (HV) levels (ASTM E92, ISO 6507-1, JIS Z2244, GB/T 4340.1) as well as HRC values, in the Laser - Powder Bed Fusion (L-PBF) heat-treated condition.

HV	HRC
282 +/−8	29 +/−1

Surface roughness

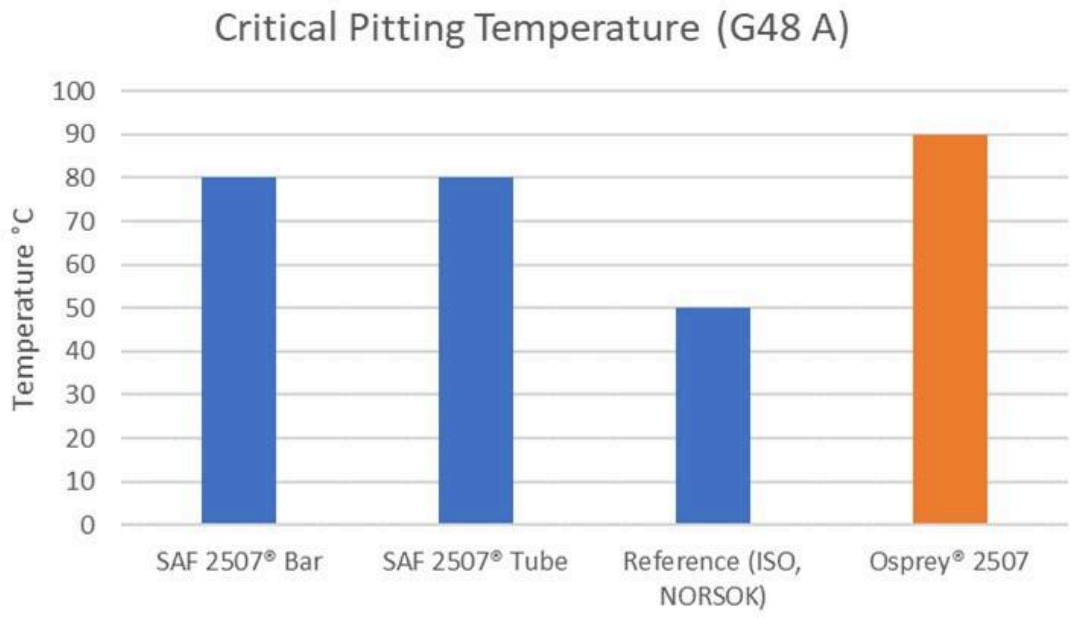
Measured surface roughness values (ISO 25178-6, ISO25178-606, DIN EN ISO 4287, ISO 4288), Laser - Powder Bed Fusion (L-PBF) heat-treated and
blasted condition.

Ra, µm	Rz, µm	Sa, µm
1.6	7.02	4.8

Corrosion properties

Corrosion properties tested on the bulk material as per the ASTM G48 and ASTM G150 standards.

Standard	Temperature (T), °C	Temperature (T), °F
ASTM G48	90	194
ASTM G150	>95	>203

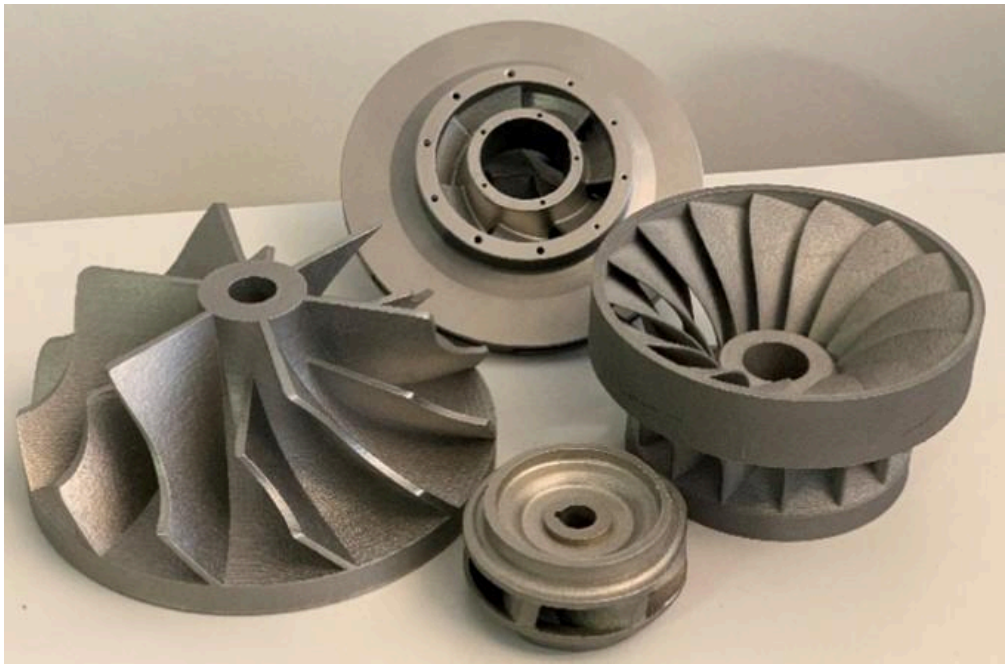


Graph showing critical pitting temperature for various materials.

Typical application areas

Osprey® 2507 powder is typically used in the following areas:

- Oil and gas industry
- Pulp and paper industry
- Chemical industry
- Refineries and petrochemical plants
- On-shore and off-shore industry



Impeller and rotor prototypes.

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 are available, from 1 kg (2.2 lb) to 200 kg (440 lb)*.

Contact our team who can support you with selecting the right packaging for your product and application.

*Some packaging options may not be available for all products due to international shipping regulations.

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