

Datasheet

Ferritic stainless steel

# Osprey® 441

Osprey® 441 is a ferritic stainless steel characterized by good corrosion resistance in acidic and chloride containing environments, and high strength.

UNS

S43940

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ASTM, AISI

441

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EN Number

X2CrTiNb18, 1.4509

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DIN

X2CrTiNb18, 1.4509

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Powder designed for

Additive Manufacturing (AM)



## Product description

Osprey® 441 is a ferritic stainless steel characterized by

Good corrosion resistance in widely varying acidic and chloride-containing environments

High strength at room temperature and elevated temperature

Excellent fabrication properties

Osprey®441 is a ferritic stainless steel that typically is used in stress-relieved condition. The alloy can potentially be used in exhaust gas environment, heat exchangers at elevated temperatures and applications that need good strength at elevated temperatures.

This metal powder is manufactured by either induction melting under Vacuum Inert Gas Atomization (VIGA) or melting under argon prior to 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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Fe	Bal.
Cr	17.5-19.0
Mn	< 1.0
C	0.005-0.030
Si	< 1.0
Nb	0.70-0.95
Ti	0.2-0.6
Ni	< 1.0
P	< 0.040
S	< 0.040

## Powder characteristics and morphology

### **Powder for Additive Manufacturing**

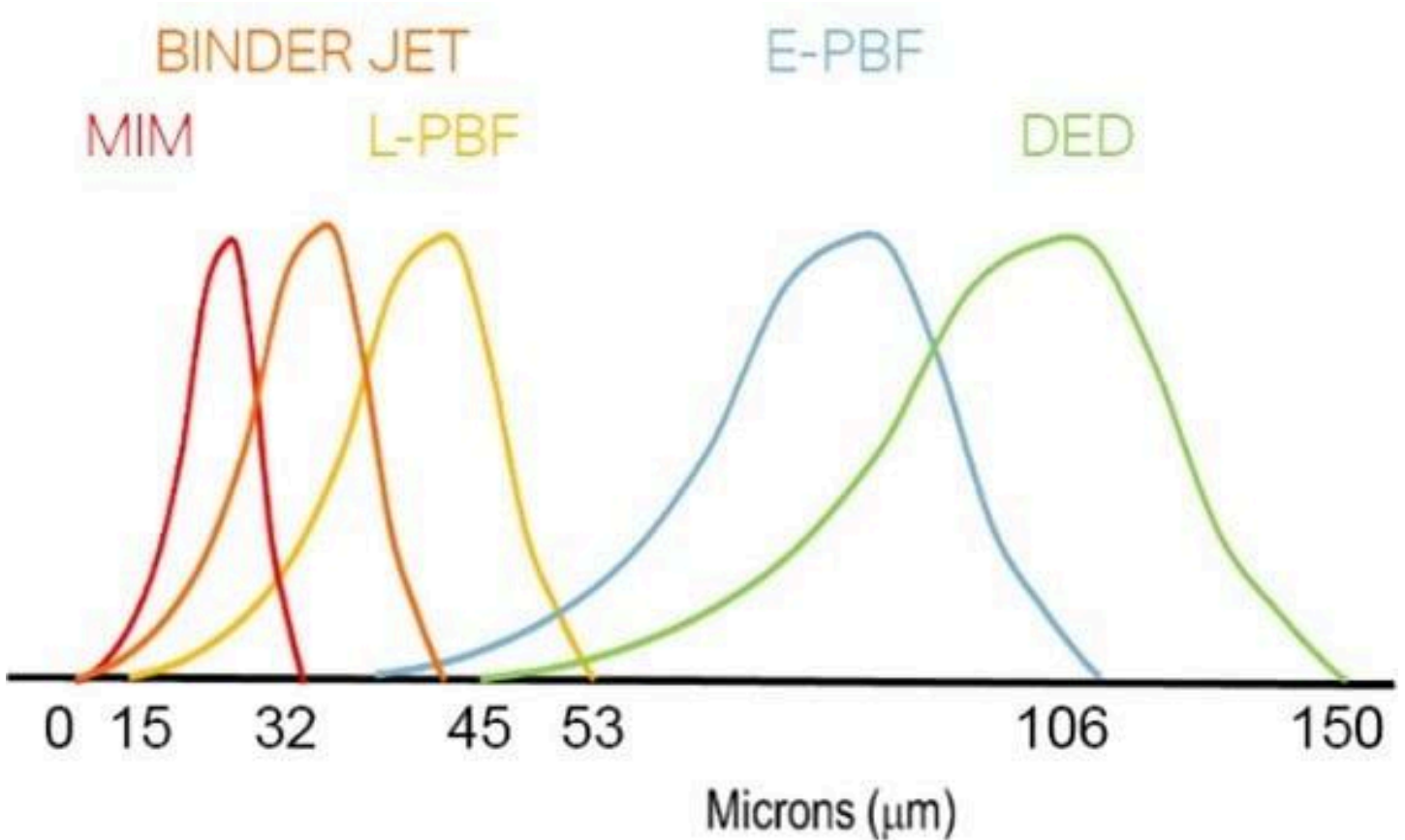
Osprey® metal powder for Additive Manufacturing is characterized by a spherical morphology and high packing density, which confer good flow properties. For powder bed processes these are essential when applying fresh powder layers to the bed to ensure uniform and consistent part build.

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.

## 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

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

## Mechanical properties

The table below displays typical mechanical properties for as-built powder bed fusion – laser beam evaluated in room temperature. Material properties are given in two material conditions, as built and heat treated, by annealing at 900 °C for 20 minutes.

Condition	Direction	Proof strength	Tensile strength	E-modulus	Elongation
		Rp0.2	Rm		A
		MPa	MPa	MPa1	%
L-PBF, as built	Horizontal	741	889	210	27.8
L-PBF, as built	Vertical	679	864	189	29.6
L-PBF, heat treated	Horizontal	546	816	199	28.9
L-PBF, heat treated	Vertical	537	810	186	28.9

1 x103

Condition	Direction	Yield strength	Tensile strength	E-modulus	Elongation, %
		Rp0.2	Rm		A
		ksi	ksi	MPa1	%
L-PBF, as built	Horizontal	107	129	30	27.8
L-PBF, as built	Vertical	98	125	27	29.6
L-PBF, heat treated	Horizontal	79	118	29	28.9
L-PBF, heat treated	Vertical	78	117	27	28.9

1 x103

Source: Sandvik and Uppsala University.

## Physical properties

### **Wrought material data**

Density: 7.7 g/cm<sup>3</sup>, 0.28 lb/in<sup>3</sup>

Thermal conductivity: 25 W/mK

Coefficient of thermal expansion: 10.0 10<sup>-6</sup> K<sup>-1</sup>

Melting point: 1500 °C (2732 °F)

## 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.