



OSPREY® ALLOY 625 FOR ADDITIVE MANUFACTURING

DATASHEET

GENERAL DESCRIPTION

Osprey® Alloy 625 is a solution-hardened, nickel-based alloy for demanding applications with high demand on low concentrations of residual elements, characterized by:

- Extremely good corrosion resistance in widely varying acidic and chloride containing environments
- High strength
- Excellent fabrication properties

Osprey® Alloy 625-AM can be used in a wide range of temperatures from -196°C to 815°C (-321°F to 1500°F). However, it should be noted that prolonged exposure to temperatures above 600°C (1100°F) may lead to embrittlement.

APPLICATIONS

Alloy 625 is an extremely versatile nickel alloy, suitable for use in both oxidizing and reducing acidic environments, such as:

- Hydrochloric acid
- Nitric acid
- Phosphoric acid
- Chloride containing environments

The grade can also be used for a wide range of temperatures from -196°C to 815°C (-321°F to 1500°F). Typical areas of use include hydraulic systems, heat-exchangers and high-temperature applications. Some industrial examples are:

- High temperature aerospace
- Chemical process industry
- Power industry

STANDARDS

- ASTM: F3056 14e1
- UNS: N06625

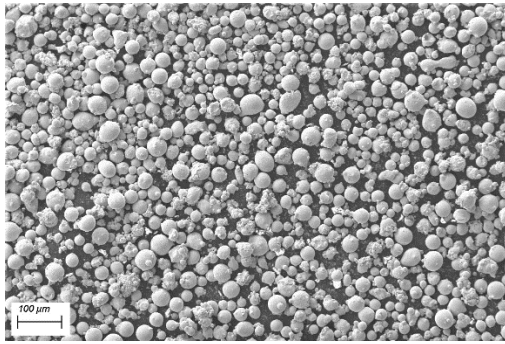
CHEMICAL COMPOSITION

Chemical composition (nominal), wt%

Ni	Cr	Fe	Mo	Nb + Ta	C	Mn	Si	P	S	Al	Ti	Co
58.0 min	20.0-23.0	<5.0	8.0-10.0	3.15-4.15	<0.10	<0.50	<0.50	<0.015	<0.015	<0.40	<0.40	<1.0

Powder manufactured by Vacuum Inert Gas Atomization typically has an oxygen and nitrogen level both <250 ppm.

POWDER MORPHOLOGY



The powder morphology of Osprey® Alloy 625 is typically spherical in morphology.

POWDER SIZE DISTRIBUTION

Available in a range of customized powder sizes suitable for different applications and AM platforms.

Metal Injection Moulding

<32 μm, <22 μm, <16 μm, <10 μm, <5 μm

Binder Jet

<45 μm, <38 μm, <22 μm, <16 μm

Laser Powder Bed Fusion (L-PBF)

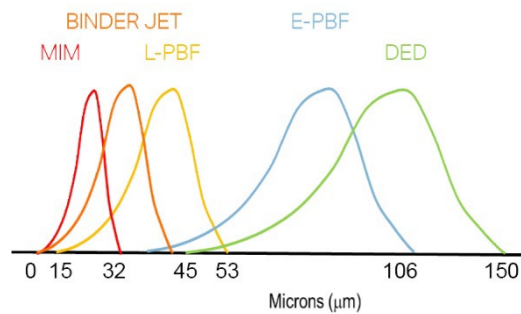
e.g. 53 to 15 μm, and 45 to 20 μm

Electron Beam Powder Bed Fusion (E-PBF)

106 to 45 μm

Direct Energy Deposition (DED)

150 to 53 μm and 90 to 45 μm



Other powder size range distributions are available by request.

MECHANICAL PROPERTIES

Typical mechanical properties for as-built and heat-treated condition for Laser- Powder Bed Fusion (L-PBF) Osprey® 17-4PH material evaluated in room temperature, as measured in independent research.¹ Heat treatment: H900 Solution Annealed (1051 °C for 1 hour in hydrogen) and Aged (482 °C for 1 hour in nitrogen).

Metric units

Condition	Direction	Proof strength	Tensile strength	E-modulus	Elongation
		R _{p0.2}	R _m		A
		MPa	MPa	MPa ¹⁾	%
As built	Horizontal	664	891	144	60
	Vertical	420	915	190	46
Heat Treated	Horizontal	590	945		44
	Vertical	544	842		51

Imperial units

Condition	Direction	Proof strength	Tensile strength	E-modulus	Elongation
		R _{p0.2}	R _m		A
		ksi	ksi	ksi ¹⁾	%
As built	Horizontal	96	129	21	60
	Vertical	61	133	28	46
Heat Treated ²⁾	Horizontal	86	137		44
	Vertical	79	122		51

1) X10³

2) Heat-treated material (1000°C, 1 hour, air cooled)

Alternative heat treatments can be applied to optimize the mechanical properties, balancing tensile strength and elongation.

Impact toughness (J) for heat-treated Osprey® Alloy 625 L-PBF material (1048°C, 1 hour, air cooled):

145 J (horizontal)

163 J (vertical)

Typical Vicker's Hardness levels (ASTM E92, ISO 6507-1, JIS Z2244, GB/T 4340.1) of Osprey® Alloy 625 L-PBF material.

Condition	Hardness HV 0,5
As built	299
Solution annealed ¹⁾	238
Solution annealed ²⁾	231

1) Heat-treated material (1048°C, 1 hour, air cooled)

2) Heat-treated material (1048°C, 1 hour, water cooled)

PHYSICAL PROPERTIES

Wrought material

Density: 8.44 g/cm³, 0.30 lb/in³

Thermal conductivity: 9.2 W/mK to 10.7 W/mK

Melting range: 1290°C to 1350°C; (2354°F to 2462°F)

Coefficient of thermal expansion: 12.8 10⁻⁶K⁻¹



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Disclaimer: Data and recommendations are provided for information and guidance only, and the performance or suitability of the material for specific applications are not warranted or guaranteed. Continuous development may necessitate changes in technical data without notice. This datasheet is only valid for Sandvik materials.