SANDVIK

OSPREY® 2507 SUPER DUPLEX FOR ADDITIVE MANUFACTURING

DATASHEET

GENERAL DESCRIPTION

Osprey® 2507 super-duplex stainless steel is a highly alloyed duplex (austenitic-ferritic) stainless steel metal powder manufactured by inert gas atomization, capable of achieving high level of mechanical strength & corrosion resistance. This grade of metal powder is designed for processing by additive manufacturing including Powder Bed Fusion, mainly for oil and gas applications that demand high levels of performance e.g. impellers, propellers, connecting valves etc.

- Excellent corrosion resistance in chloride environments (PREN~ 43)
- Excellent mechanical properties
- High resistance to general corrosion
- Design flexibility due to additive manufacturing technology

APPLICATIONS

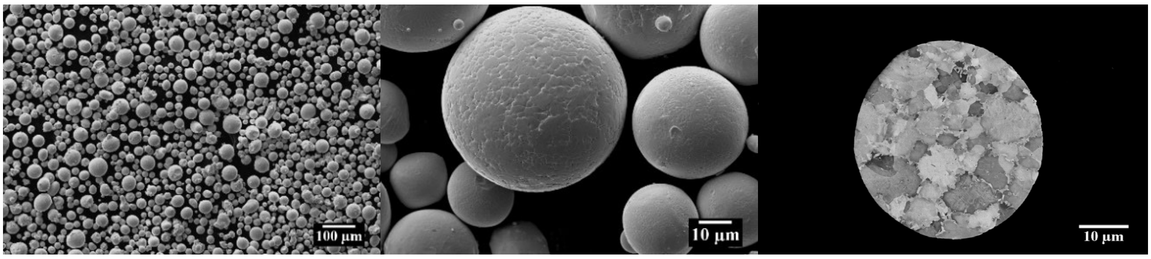
- Oil and gas industry
- Pulp and paper industry
- Chemical industry
- Refineries and petrochemical plants
- On-shore and off-shore industry

CHEMICAL COMPOSITION

Chemical composition (nominal), wt%

Fe	Cr	Ni	Mo	Mn	Si	N	Cu	C	P	S
Balance	25.0	7.0	4.0	<1.2	<0.8	0.30	<0.50	<0.030	<0.035	<0.015

POWDER MORPHOLOGY



SEM micrographs of Osprey® 2507 a) -53 +15 µm powder with a spherical morphology, b) smooth surface and low level of powder satellites and c) micrograph of powder in cross-section, in back scatted electron mode, highlighting the fine cellular structure.

POWDER SIZE DISTRIBUTION

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

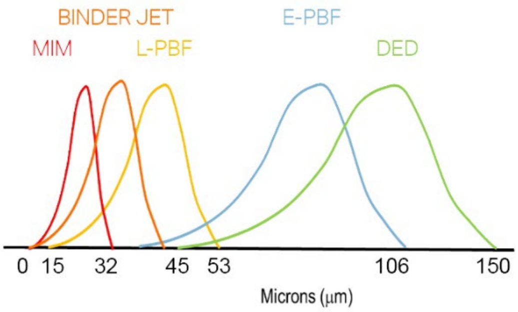
Metal Injection Moulding
<32 µm, <22 µm, <16 µm, <10 µm, <5 µm

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

Tensile properties, metric units

Condition	Direction	Temperature	Proof strength	Tensile strength	E-modulus	Elongation
		T	Rp0.2	Rm		A
		°C	MPa	MPa	GPa	%
Heat treated	Horizontal	20	627	956	207	39
	Vertical	20	626	923	202	43
Heat treated	Horizontal	100	548	878	205	33
	Vertical	100	546	854	205	36
Heat treated	Horizontal	200	505	823	196	30
	Vertical	200	504	797	195	31
Heat treated	Horizontal	300	517	857	190	30
	Vertical	300	505	832	190	32

Tensile properties, imperial units

Condition	Direction	Temperature	Proof strength	Tensile strength	E-modulus	Elongation
		T	Rp0.2	Rm		A
		°F	ksi	ksi	ksi	%
Heat treated	Horizontal	68	90	138	30	39
	Vertical	68	90	133	29	43
Heat treated	Horizontal	212	79	127	30	33
	Vertical	212	79	123	30	36
Heat treated	Horizontal	392	73	119	28	30
	Vertical	392	73	116	28	31
Heat treated	Horizontal	572	74	124	28	30
	Vertical	572	73	121	28	32

Impact strength, metric units

Condition	Direction	Temperature	Impact energy
		T	W
		°C	J
Heat treated	Horizontal	-50	198
	Vertical	-50	235
Heat treated	Horizontal	0	237
	Vertical	0	250
Heat treated	Horizontal	20	242
	Vertical	20	247
Heat treated	Horizontal	50	248
	Vertical	50	263

Impact strength, imperial units

Condition	Direction	Temperature	Impact energy
		T	W
		°F	Ft-lb
Heat treated	Horizontal	-58	146
	Vertical	-58	173
Heat treated	Horizontal	32	174
	Vertical	32	184
Heat treated	Horizontal	68	178
	Vertical	68	182
Heat treated	Horizontal	122	182
	Vertical	122	194

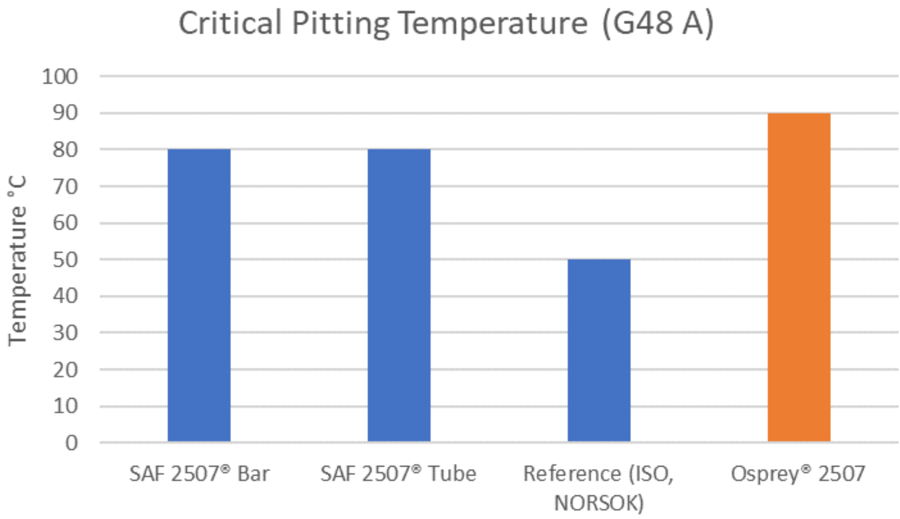
Typical Vicker’s Hardness levels (ASTM E92, ISO 6507-1, JIS Z2244, GB/T 4340.1) in L-PBF heat-treated condition.

Condition	Hardness	
Heat treated	HV	HRC
Heat treated	282±8	29±1

Measured surface roughness values (ISO 25178-6, ISO25178-606, DIN EN ISO 4287, ISO 4288), in the L-PBF heat-treated and blasted conditions.

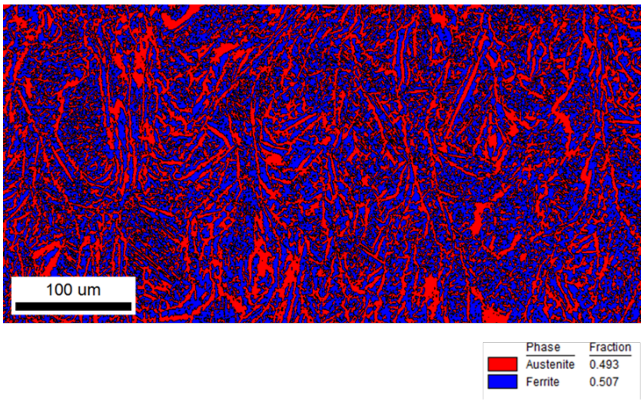
Condition	Surface roughness		
	Ra	Rz	Sa
	µm	µm	µm
Blasted	1.6	7.02	4.8

Condition	Critical pitting temperature	
	ASTM G48	ASTM G150
	°C	°C
Heat treated	90	>95



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 1040-1110 °C followed by air or water cooling is performed.



Micrographs of Osprey® 2507 a) As-built vertical section of the test specimen with near full dense part with 99,9%+ relative density, b) EBSD image indicating phase balance and microstructure in the material after suitable heat treatment.

PROTOYPES