

# OSPREY® MAR-60HRC FOR ADDITIVE MANUFACTURING

## DATASHEET

### GENERAL DESCRIPTION

Osprey® MAR-60HRC is a maraging steel powder manufactured by inert gas atomization, capable of achieving ultra-high level of mechanical strength & hardness. This new grade of metal powder is designed for processing by Additive Manufacturing including Powder Bed Fusion, for advanced applications that demand high levels of performance e.g. conformal cooled injection mold tools, extrusion tools, die casting dies, cores and core pins.

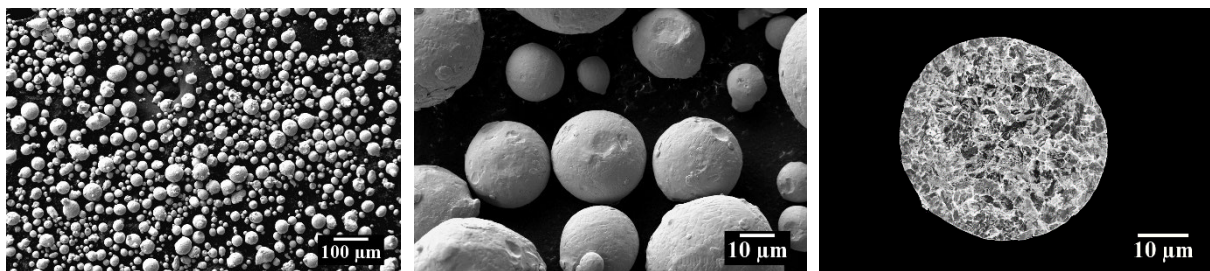
- Ultra-high mechanical strength and hardness (60 HRC)
- Suitable of applications in plastic and metal injection mould tools

### CHEMICAL COMPOSITION

Chemical composition (nominal), wt%

Fe	Co	Ni	Mo	Ti	Cr	Mn	Si	Al	C	P	S	O	N
Balance	15.0	13.0	10.0	0.20	<0.30	<0.10	<0.10	0.01	<0.030	<0.010	<0.010	<0.1	<0.1

### POWDER MORPHOLOGY



SEM micrographs of a) -53 +15 µm powder with spherical morphology, b) smooth surface and low level of powder satellites and c) micrograph of powder in cross-section, in back-scattered 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

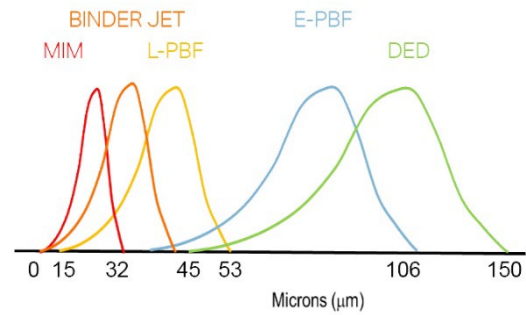
Binder Jet

<45 µm, <38 µm, <22 µm, <16 µm

Laser Powder Bed Fusion (L-PBF)  
e.g. 53 to 15  $\mu\text{m}$ , and 45 to 20  $\mu\text{m}$

Electron Beam Powder Bed Fusion (E-PBF)  
106 to 45  $\mu\text{m}$

Direct Energy Deposition (DED)  
150 to 53  $\mu\text{m}$  and 90 to 45  $\mu\text{m}$



Other powder size range distributions are available by request.

## MECHANICAL PROPERTIES

Typical mechanical properties of Osprey® MAR-60HRC L-PBF, evaluated at room temperature

Metric units

Condition	Direction	Proof strength	Tensile strength	E-modulus	Elongation	Area reduction
		R <sub>p0.2</sub>	R <sub>m</sub>			
		MPa	MPa	GPa	%	%
As built	Horizontal	1279	1423	204	16.8	58
	Vertical	1301	1405	190	16.9	63

Imperial units

Condition	Direction	Proof strength	Tensile strength	E-modulus	Elongation	Area reduction
		R <sub>p0.2</sub>	R <sub>m</sub>			
		ksi	ksi	ksi	%	%
As built	Horizontal	185	206	30,000	16.8	58
	Vertical	189	204	28,000	16.9	63

Typical mechanical properties of as-built Osprey® MAR-60HRC L-PBF in heat-treated condition (Aged 480 °C for 6 h)

Metric units

Condition	Direction	Proof strength	Tensile strength	E-modulus	Elongation	Area reduction
		R <sub>p0.2</sub>	R <sub>m</sub>			
		MPa	MPa	GPa	%	%
Heat treated	Horizontal	2477	2640	212	1.8	6
	Vertical	2310	2470	197	1.8	6

Imperial units

Condition	Direction	Proof strength	Tensile strength	E-modulus	Elongation	Area reduction
		R <sub>p0.2</sub>	R <sub>m</sub>			
		ksi	ksi	ksi	%	%
Heat treated	Horizontal	360	382	31,000	1.8	6
	Vertical	335	358	29,000	1.8	6

Typical Rockwell Hardness levels (ASTM E18, ISO 6508-1, JIS Z2245, GB/T 230), in the L-PBF as-built and heat-treated conditions.

Condition	Direction	Hardness HRC
As built	Horizontal	41
As built	Vertical	41
Heat treated	Horizontal	60



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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.