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Material Product Data Sheet
MM509 Cobalt Superalloy Powder for Additive Manufacturing

Powder Products:
MetcoAdd MM509-A

1 Introduction

MetcoAdd™ MM509-A is an CoNiCrWTa superalloy powder with a chemistry similar to Mar-M-509. The material is optimized for producing additive manufactured components using Laser Powder Bed Fusion (PBF-LB).

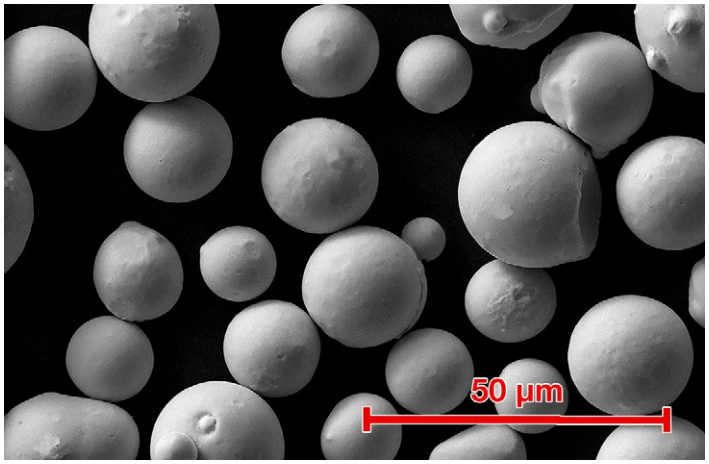
Components manufactured using MetcoAdd MM509-A and properly post-processing heat treatment have been shown to be comparable with those of cast Mar-M-509. They maintain strength and resist creep at elevated temperatures.

For reference purposes, Oerlikon has processed MetcoAdd MM509-A using fixed parameters and 40 µm layer thickness to provide data in Section 3.1 of this document. Properties may be optimized based on application specific requirements.

1.1 Typical Uses and Applications:

- Flight and Industrial Gas Turbine Components such as:
  - Blades
  - Vanes
  - Nozzle Guide Vanes
  - Carrier Rings

Quick Facts	
Classification	Alloy, Co-based
Chemistry	Co 24Cr 10Ni 7W 3.5Ta 0.55C
Manufacture	Gas atomized (Argon)
Morphology	Spheroidal
Apparent Density	> 4 g/cm^3 (typical)
Solidus	1334 ± 10 °C (2433 ± 18 °F)
Liquidus	1442 ±10 °C (2628 ± 18 °F)
Purpose	Additive Manufacturing
Process	Laser Powder Bed Fusion (PBF-LB)



Typical morphology of MetcoAdd MM509-A gas atomized powder for additive manufacturing.

2 Material Information

2.1 Chemical Composition

Product	Weight Percent (nominal)						
	Co	Cr	Ni	W	Ta	C	Other
MetcoAdd MM509-A	Balance	24	10	7	3.5	0.55	< 1

2.2 Particle Size Distribution

Product	Nominal Range [µm]	D90 [µm]	D50 [µm]	D10 [µm]
MetcoAdd MM509-A	-45 +15	50	33	19

For the nominal range, particle size analysis 45 µm or above measured by sieve (ASTM B214), analysis below 45 µm by laser diffraction (ASTM C 1070, Microtrac). Fractional analysis (D90, D50, D10) are nominal values by laser diffraction.

2.3 Key Selection Criteria

- MetcoAdd MM509-A is designed for the manufacture of components using L-PBF and offers optimized spreadability and dense packing.
- MetcoAdd MM509-A powder is stable and designed to prevent undesirable agglomeration during powder-bed fusion processing.
- Choose MetcoAdd MM509-A for applications where strength and creep resistance must be maintained at elevated temperatures.

2.4 Related Products

- Oerlikon Metco offers other superalloy materials, such as 625 and 718 type alloys, for additive manufacturing. We offer a range of iron-, nickel-, cobalt- and titanium-based additive manufacturing metal powders that have been optimized for either powder-fed or powder-bed processes. Please contact your Oerlikon Metco Account Representative for more information.
- In addition, Mar-M-509 type powders are available for brazing and coating applications. Your Oerlikon Metco Account Representative can provide you with further details.

2.5 Specifications

Product	Specifications (similar to)
MetcoAdd MM509-A	Mar-M-509

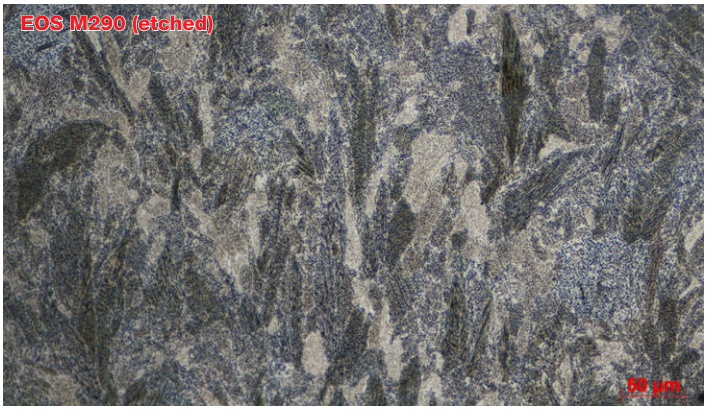
3 Key Processing Information

3.1 Typical Post Heat Treatment Properties (MetcoAdd MM509-A) [a, b, c]

Specification		EOS M290
Ultimate Tensile Strength (MPa), XY/Z	ASTM E8	1205 ± 7 / 1177 ± 21
Yield Strength (MPa), XY/Z		693 ± 7 / 662 ± 7
Elongation at break %, XY/Z		5 ± 1 / 5 ± 1
Hardness (VHN_{300})	ASTM E384-17	538 ± 19
Relative Density %	Internal Specification	> 99.9

[a] Disclaimer: All data published in this datasheet has been shared for reference purposes only and is not sufficient to design or certify parts. No warranty or guarantee is made against these results.
[b] Bounds are based on one standard deviation of each population with seven to ten samples per orientation and machine. Test specimens were 6.35 mm (0.25 in) diameter round bars machined from coupons 130 x 130 x 13 mm (5 x 5 x 0.5 in). Direction XY data is an average of both X and Y horizontal build orientations.
[c] Heat treatment was performed as follows: Solutionize at 1275 °C (2327 °F) for 2.5 h. Age at 927 °C (1700 °F) for 20 h. Nitrogen cool at 1 bar.

3.2 Post Heat Treatment Microstructure (MetcoAdd MM509-A)



3.3 Additive Manufacturing Services

Oerlikon AM is an excellent source for pilot and production run additive manufacturing services and is ready to serve your needs. Please contact your Oerlikon Metco account manager for more information or contact Oerlikon AM directly through their web site at www.oerlikon.com/am.

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
MetcoAdd MM509-A	1303268	10 lb (approx. 4.5 kg)	Stock	Global

4.2 Handling Recommendations

- Blend contents prior to use to prevent segregation
- Keep in the original container, or an approved alternative, tightly closed when not in use
- Powder from previously opened containers should be stored in a humidity-controlled environment

4.3 Safety Recommendations

See the SDS 50-2216 (Safety Data Sheet) in the version localized for the country where the material will be used. SDS are available from the Oerlikon web site at www.oerlikon.com/metco (Resources – Safety Data Sheets).

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