

Material Product Data Sheet

Nickel – Chromium – Tungsten – Molybdenum Powder for Additive Manufacturing

Powder Products: MetcoAdd H23X-A

1 Introduction

MetcoAdd™ H23X-A is a nickel-based powder product with chemistry similar to AMS 5891 and Haynes H230 bar material. The material is optimized for producing additive manufactured components using Laser Powder Bed Fusion (PBF-LB).

Components manufactured using MetcoAdd H23X-A and properly post-processing heat treatment exhibit thermal stability and strength at elevated temperatures, as well as high resistance to nitriding and corrosive environments.

Room temperature static properties of PBF-LB processed and heat treated material coupons have been shown to be comparable to those of AMS 5891. Elevated temperature tensile and creep rupture data may be made available upon request.

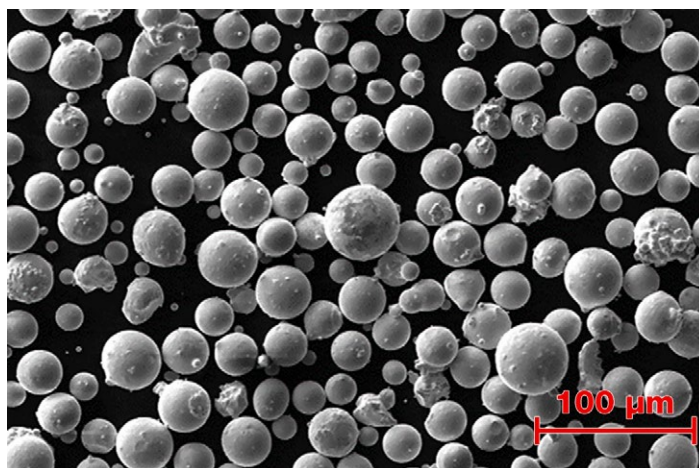
For reference purposes Oerlikon has processed MetcoAdd H23X-A using 40 µm layer thickness to provide data in Section 3.1 of this document. Properties may be optimized based on application specific requirements.

1.1 Typical Uses and Applications:

- Aerospace gas turbine engine components
- Power generation gas turbine components
- Industrial components requiring high temperature corrosion resistance for chemical, metallurgical and mineral processing industries.

Quick Facts

Classification	Alloy, Ni-based
Chemistry	NiCrWMo
Manufacture	Gas atomized (Argon)
Morphology	Spheroidal
Apparent Density	4.5 to 5 g/cm ³ (typical)
Solidus	1327 ± 10 °C (2420 ± 18 °F)
Liquidus	1455 ± 10 °C (2651 ± 18 °F)
Purpose	Additive Manufacturing
Process	Laser Powder Bed Fusion (PBF-LB)



Typical morphology of MetcoAdd H23X-A gas atomized powder for additive manufacturing.

2 Material Information

2.1 Chemical Composition

Product	Weight Percent (nominal)								
	Ni	Cr	W	Mo	Mn	Si	Al	C	La
MetcoAdd H23X-A	Balance	20 – 24	13 – 15	1 – 3	0.3 – 1.0	0.25 – 0.75	0.20 – 0.50	0.05 – 0.15	0.005 – 0.05
	Co	Fe	Cu	Ti	P	S	B	Other	
	< 5.00	< 3.00	< 0.50	< 0.10	< 0.03	< 0.015	< 0.015	< 0.1	

2.2 Particle Size Distribution and Hall Flow

Product	Nominal Range [µm]	D90 [µm]	D50 [µm]	D10 [µm]	Hall Flow [s/50 g]
MetcoAdd H23X-A	-45 +15	49	35	25	< 20 (typical)

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. Hall flow (ASTM B213).

2.3 Key Selection Criteria

- MetcoAdd H23X-A is designed for the manufacture of components using L-PBF and offers optimized spreadability and dense packing.
- MetcoAdd H23X-A powder is stable and designed to prevent undesirable agglomeration during powder-bed fusion processing.
- Choose MetcoAdd H23X-A for applications where high strength and long-term thermal stability is needed at elevated temperatures, combined with corrosion and nitriding resistance.

2.4 Related Products

- Oerlikon Metco offers various stainless steel, nickel-based, cobalt-based and iron-based powders designed for additive manufacturing that have been optimized for either powder-fed or powder-bed processes. Please contact your Oerlikon Metco Account Representative for more information.
- Oerlikon Metco also offers superalloy materials for applications where corrosion is a concern such as materials that are similar to Inconel 625, Inconel 718 as well as titanium. Your Oerlikon Metco Account Representative can provide you with further details.

2.5 Specifications

Product	Specifications (similar to)
MetcoAdd H23X-A	UNS N06230 AMS 5891 Haynes H230

3 Key Processing Information

3.1 Typical Post Heat Treatment Properties (MetcoAdd H23X-A) ^{a, b, c}

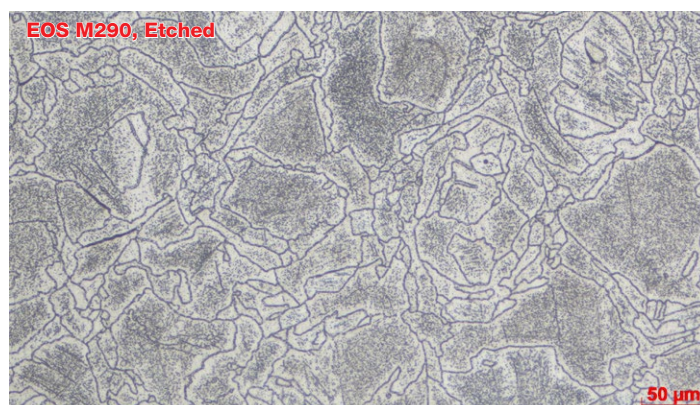
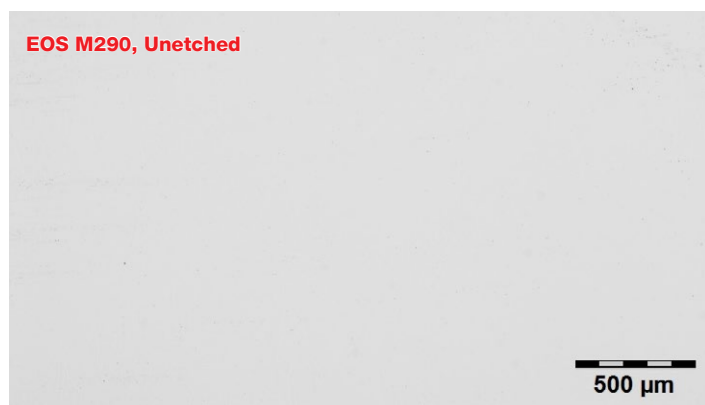
Specification		EOS M290
Ultimate Tensile Strength (MPa), XY/Z		887 ± 20 / 836 ± 18
Yield Strength (MPa), XY/Z	ASTM E8	507 ± 13 / 478 ± 6
Elongation at break %, XY/Z		32 ± 4 / 47 ± 2
Hardness (VHN ₃₀₀)	ASTM E384-17	247 ± 16
Relative Density %	Internal Specification	> 99.9

^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 ten samples per orientation. 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 in accordance with AMS 5891B. Solutionized coupons at 2150 °F (1177 °C), held for 1 hr and rapid air cooled (RAC).

3.2 Post Heat Treatment Microstructure, Vertical Build Direction (MetcoAdd H23X-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 H23X-A	2277037	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 50-2301 (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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