oerlikon
metco

Material Product Data Sheet
Nickel Alloy HX for Additive Manufacturing

Powder Products:
MetcoAdd HX Series

1 Introduction

MetcoAdd™ HX is a family of nickel-based solid solution strengthened powder products with chemistry similar to AMS 5536, EN 2.4665 and UNS N06002. This material has been optimized to mitigate cracking when processing with laser powder bed fusion.

Room temperature static properties of PBF-LB processed and heat treated material coupons have been shown to be comparable to those of AMS 5536 plate and well in excess of AMS 5390 cast material. Elevated temperature tensile and creep rupture data may be made available upon request.

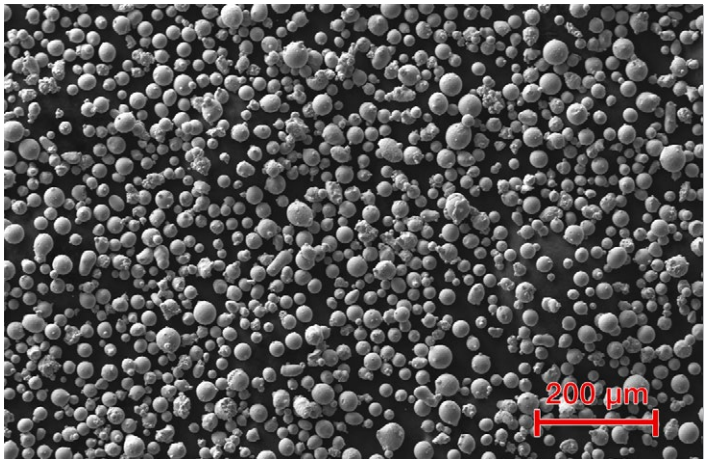
For reference purposes Oerlikon has processed MetcoAdd HX materials using a 40 µm layer thickness to provide data in Section 3. Properties may be optimized based on application specific requirements.

MetcoAdd HX-D and MetcoAdd HX-L are premium products with reduced carbon content as well as tightly controlled trace elements and entrained gases.

1.1 Typical Uses and Applications

- Aerospace: Gas turbine and airframe parts
- Power Generation: Gas turbine parts
- Parts for petrochemical applications
- Industrial furnace components
- Structural components

Quick Facts	
Classification	Alloy, nickel-based
Chemistry	Ni 22Cr 18.5Fe 9Mo 1.5Co 0.6W
Manufacture	Inert gas atomized (Argon)
Morphology	Spherical
Apparent Density	> 4 g/cm^3 (typical)
Solidus	1374 ± 10 °C (2505 ± 18 °F)
Liquidus	1397 ± 10 °C (2546 ± 18 °F)
Process	Laser Powder Bed Fusion (PBF-LB)



Typical spherical morphology of MetcoAdd HX-D.

© 2024 Oerlikon Metco

2 Material Information

2.1 Chemical Composition

Product	Weight Percent (nominal unless noted)							
	Ni	**Cr**	**Fe**	**Mo**	**Co**	**W**	**C**	**Mn**
	Balance	21.7	18.5	9	1.5	0.6	0.02	0.75 max
MetcoAdd HX Series	**Si**	**Cu**	**Al**	**Ti**	**P**	**S**	**B**	
	0.75 max	0.5 max	0.50 max	0.15 max	0.02 max	0.02 max	0.01 max	

2.2 Particle Size Distribution and Hall Flow

Product	Nominal Range [µm]	D90 [µm]	D50 [µm]	D10 [µm]	Hall Flow (s/50 g)
MetcoAdd HX-D	-45 +15	42	28	18	< 20
MetcoAdd HX-L	-53 +20	55	37	25	< 20

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) by laser diffraction, Hall flow by ASTM B213.

2.3 Key Selection Criteria

- Choose MetcoAdd HX series when a high-strength nickel alloy is needed that resists corrosion in service and cracking during printing.
- MetcoAdd HX-D is designed to allow for high PBF-LB build rates where application and process permit.
- Choose MetcoAdd HX-L when a coarser material optimized for printing using large PBF-LB printers is needed.

2.4 Related Products

- Oerlikon Metco offers other nickel-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 can produce MetcoAdd HX in different particle size distributions on request for large volume users.

2.5 Specifications

Product	Specifications (similar to)
MetcoAdd HX Series	UNS N06002

3 Key Processing Information

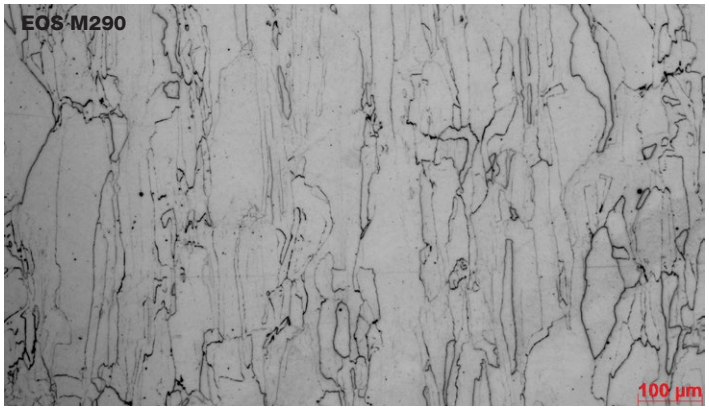
3.1 Typical Post Heat Treatment Properties (MetcoAdd HX-D) [a, b, c]

Specification		EOS M290
Ultimate Tensile Strength (MPa), XY/Z	ASTM E8	690 ± 17 / 618 ± 4
Yield Strength (MPa), XY/Z		393 ± 9 / 388 ± 5
Elongation at break %, XY/Z		44 ± 6 / 71 ± 3
Hardness (HRB)	ASTM E18	94 ± 1
Relative Density %	ASTM E1245	> 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 five samples per orientation. Test specimens were 6.35 mm diameter round bars machined from coupons 130 x 130 x13 mm (5 x 5 x 0.5 in). Direction XY data is an average of both X and Y horizontal build orientations.
[c] Solutionize at 2150 °F (1177 °C) for 1 hr and rapid air cooled (RAC).

© 2024 Oerlikon Metco

3.2 Post Heat Treatment Microstructure, Vertical Build Direction (MetcoAdd HX-D)



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 HX-D	1301896	10 lb (approx. 4.5 kg)	Stock	Global
MetcoAdd HX-L	2360380	10 kg (approx. 22 lb)	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 SDS 50-2032 (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).

Information is subject to change without prior notice.

© 2024 Oerlikon Metco

www.oerlikon.com/metco
info.metco@oerlikon.com