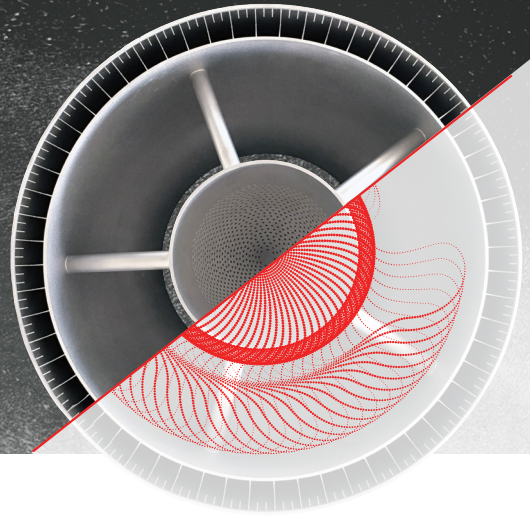


# Additive Manufacturing Nickel Alloy X



## Optimized for Processing in Laser Powder Bed Fusion (PBF-LB)

MetcoAdd™ HX-D is a nickel-based solid solution strengthened powder product 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-D using 40 µm layer thickness to provide data below. Properties may be optimized based on application specific requirements.

### Applications

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

### Typical Post Heat Treatment Properties (HX-D) <sup>[1] [2] [3]</sup>

	EOS M290	Test Method
Ultimate Tensile Strength (MPa), XY/Z	690±17 / 618±4	ASTM E8
Yield Strength (MPa), XY/Z	393±9 / 388±5	
Elongation at break %, XY/Z	44±6 / 70±3	
Hardness (HRB)	94±1	ASTM E18
Relative Density %	>99.9%	ASTM E1245

[1] 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.

[2] 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 (130x130x13mm). Direction XY data is an average of both X and Y horizontal build orientations.

[3] Solutionize at 2150°F (1177°C) for 1 hr. Rapid Air Cool (RAC).

### Post Heat Treatment Microstructure (x 10 magnification, Vertical Build Direction)

#### EOS M290



MetcoAdd HX-D

Chemical Composition

MetcoAdd HX-D	Weight Percent (nominal)							
	Ni	Cr	Fe	Mo	Co	W	C	Mn
	Balance	20.50-23.00	17-20	8-10	0.50-2.50	0.20-1.00	0.05-0.15	< 1.00
	Si	Cu	Al	Ti	P	S	B	
	< 1.00	< 0.50	< 0.50	< 0.15	< 0.04	< 0.03	< 0.01	

Particle Size Distribution and Hall Flow

	Nominal Range [µm]	D90 [µm]	D50 [µm]	D10 [µm]	Hall Flow
MetcoAdd HX-D	-45 +15	42	28	18	< 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) are nominal values by laser diffraction. Hall flow (ASTM B213).

Product Information

Classification	Alloy, Nickel Base
Chemistry	NiCrFeMo
Manufacture	Gas atomized (Argon)
Morphology	Spheroidal
Apparent Density	> 4 g/cm³ (typical)
Solidus	1374 ± 10 °C (2505 ± 18 °F)
Liquidus	1397 ± 10 °C (2546 ± 18 °F)
Process	Laser Powder Bed Fusion (PBF-LB)
Safety Data Sheet	50-2032 <a href="http://www.oerlikon.com/metco">www.oerlikon.com/metco</a>
Package size	4.5 kg/ 10 lb approx. (stock)
Distribution	Global
Order No.	1301896

Usage 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



28  
Ni  
Nickel

27  
Co  
Cobalt

26  
Fe  
Iron

22  
Ti  
Titanium

AM Metal Powder Portfolio

Check our full portfolio at <https://www.oerlikon.com/am/en/offerings/metal-powders> or contact us at [am@oerlikon.com](mailto:am@oerlikon.com)

We have a broad range of existing alloys, supported by ongoing development. We also know that current off-the-shelf solutions in AM cannot answer every production need. Our R&D teams can rapidly design, optimize, and produce new and custom alloy chemistries for pilot atomization and AM validation in our production facilities.