

Material Product Data Sheet

738 Nickel-Based, Low Carbon Superalloy Powder for Additive Manufacturing

Powder Products:
MetcoAdd 738LC-A

1 Introduction

MetcoAdd™ 738LC-A is a high gamma prime nickel based, low carbon superalloy where the composition has been modified to improve the printability of the alloy and minimize cracking known to be present in printing the cast composition. The alloy powder has been printed with no or minimal cracks. Printability depends on machine type, optimized parameters and process variables such as beam morphology and/or printing temperature.

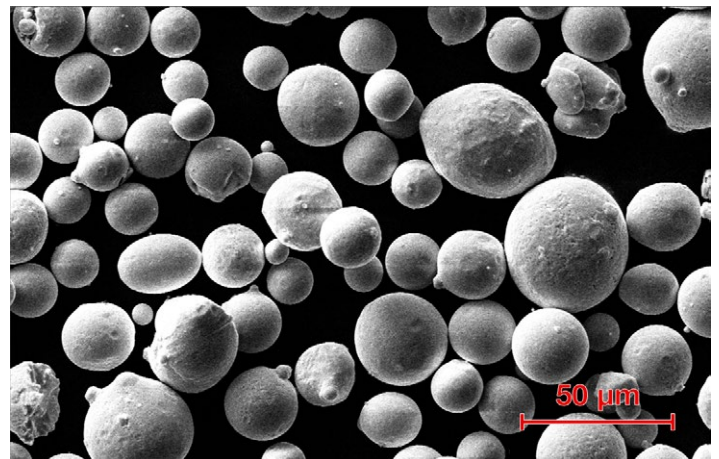
Heat treated material properties at room temperature have been shown to be comparable to those of AMS 5410. Printed and heat treated samples of the modified composition have shown favorable tensile strength [at 816 °C (1500 °F)] and hardness when compared with conventionally cast and heat treated material.

1.1 Typical Uses and Applications:

- Gas turbine engine hot section components
- Blades and heat shields

Quick Facts

Classification	Superalloy, Ni-based
Chemistry	Ni 16Cr 7(Al+Ti) 9Co 4Fe 3W 2Mo 2Ta 0.1C
Manufacture	Gas atomized (Argon)
Morphology	Spheroidal
Apparent Density	> 4 g/cm ³ (typical)
Purpose	Additive Manufacturing
Process	Laser Powder Bed Fusion (PBF-LB)



Typical morphology of MetcoAdd 738LC-A gas atomized powder for additive manufacturing.

2 Material Information

2.1 Chemical Composition

Product	Weight Percent (nominal)								
	Ni	Cr	Al + Ti	Co	Fe	W	Mo	Ta	C
MetcoAdd 738LC-A	Balance	16	7	9	4	3	2	2	< 0.1

2.2 Particle Size Distribution and Hall Flow

Product	Nominal Range [µm]	D90 [µm]	D50 [µm]	D10 [µm]
MetcoAdd 738LC-A	-45 +15	49	31	21

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 738LC-A is designed for the manufacture of components using L-PBF and offers optimized spreadability and dense packing.
- MetcoAdd 738LC-A powder is stable and designed to prevent undesirable agglomeration during powder-bed fusion processing.
- Components printed from MetcoAdd 738LC-A offer very good oxidation resistance and excellent hot corrosion resistance. In addition, its composition and low carbon content provide improved stress and creep rupture strength compared to other superalloys such as 713.

■ 2.4 Related Products

- Oerlikon Metco offers other nickel- and cobalt-based superalloy powders for additive manufacturing. In addition, 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.

2.5 Specifications

Product	Specifications (similar to)
MetcoAdd 738LC-A	AMS 5410 Alloy IN-738

3 Key Processing Information

3.1 Typical Post Heat Treatment Properties (MetcoAdd 738LC-A) ^{a, b, c}

Specification		EOS M290
Ultimate Tensile Strength (MPa), XY/Z		1257 ± 34 / 1400 ± 41
Yield Strength (MPa), XY/Z	ASTM E8	1013 ± 8 / 984 ± 19
Elongation at break %, XY/Z		6 ± 1 / 12 ± 1
Hardness (VHN ₃₀₀)	ASTM E384-17	443 ± 15
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.

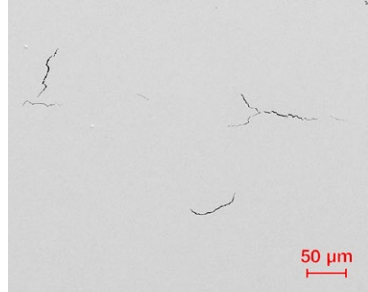
^b Bounds are based on one standard deviation of each population with ten samples per orientation and machine. Test specimens were 6.35 mm (0.25 in) diameter round bars machined from coupons (x, y, z) 75 x 75 x 13 mm (3 x 3 x 0.5 in). Direction XY data is an average of both X and Y horizontal build orientations.

^c Solutionize at 1121 °C ± 6 °C (2050 °F ± 10 °F) for 120 minutes. Age at 843 °C ± 6 °C (1550 °F ± 10 °F) for 24 hours.

3.2 Post Heat Treatment Microstructure, Vertical Build Direction (MetcoAdd 738LC-A)

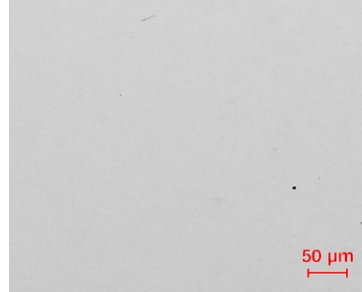
Cast Alloy Chemistry vs. MetcoAdd 738LC-A (EOS M290)

Cast Alloy Chemistry
(Unetched)



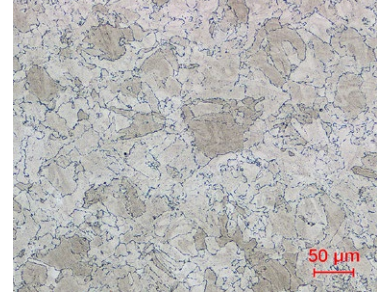
For comparison only, high degree of cracking in as-built state.

MetcoAdd 738LC-A
(Unetched)



Minimized cracking in as-built state.

MetcoAdd 738LC-A
Etched



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 738LC-A	1300957	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 50-2394 (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.