

Material Product Data Sheet

High Strength Precipitation Hardenable Steel (15-5PH) Type Powder for Additive Manufacturing

Powder Products:

MetcoAdd 15-5PH-A, MetcoAdd 15-5PH-B

1 Introduction

MetcoAdd™ 15-5PH-A and 15-5PH-B are martensitic, precipitation-hardening stainless steel alloy products with chemistry similar to AMS 5659.

Room temperature static properties of PBF-LB processed and heat treated material coupons have been shown to be comparable to those of AMS 5659 in the H900 state.

For reference purposes, Oerlikon has processed MetcoAdd 15-5PH-A using fixed parameters and 40 µm layer thickness to provide data below. Additional testing has been performed by an extensive network of consortia and customer partners on a broader range of machine types. Properties may be optimized based on application specific requirements.

MetcoAdd 15-5PH-A has been designed for Laser Powder Bed Fusion (PBF-LB), whereas MetcoAdd 15-5PH-B is designed for Directed Energy Deposition (DED).

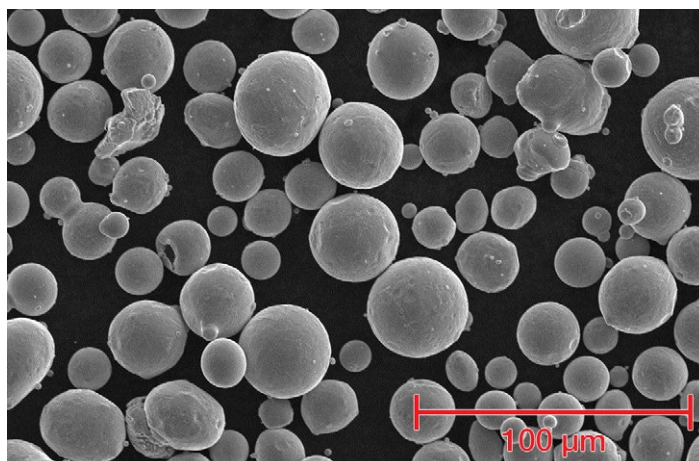
1.1 Typical Uses and Applications:

- Tools and dies
- Plastic injection molds
- Aerospace applications
- Chemical processing equipment
- Nuclear applications
- Oil and petrochemical refining equipment
- Food processing equipment
- Surgical parts

Quick Facts

Classification	Alloy, iron-based
Chemistry	FeCrNiCu
Manufacture	Gas atomized (Argon)
Morphology	Spheroidal
Apparent Density	> 4.0 g/cm ³ (typical)
Melting Point	1420 °C (2590 °F) (typical)
Purpose	Additive Manufacturing
Process	Laser Powder Bed Fusion (PBF-LB), Directed Energy Deposition (DED) ^a

^a For additive manufacture printing build-up and/or repair only.



Typical morphology of MetcoAdd 15-5PH-A gas atomized powder for additive manufacturing.

2 Material Information

2.1 Chemical Composition

Product	Weight Percent (nominal)					
	Fe	Cr	Ni	Cu	Nb	C
MetcoAdd 15-5PH series	Balance	14.5	4.5	3.5	0.3	≤ 0.07

2.2 Particle Size Distribution and Hall Flow

Product	Nominal Range [µm]	D90 [µm]	D50 [µm]	D10 [µm]	Hall Flow [s/50 g]
MetcoAdd 15-5PH-A	-45 +15	50	33	20	≤ 25
MetcoAdd 15-5PH-B	-90 +45	---	---	---	≤ 25

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 15-5PH-A is designed for the manufacture of components using L-PBF and offers optimized spreadability and dense packing.
- MetcoAdd 15-5PH-A powder is stable and designed to prevent undesirable agglomeration during powder-bed fusion processing.
- MetcoAdd 15-5PH-B is designed for the manufacture of components using DED and offers optimized powder feeding.

2.4 Related Products

- Oerlikon Metco offers various 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.
- For a high-strength, 17-4PH type stainless steel powder, the use of MetcoAdd 17-4PH series is recommended.

2.5 Specifications

Product	Specifications (similar to)
MetcoAdd 15-5PH-A	UNS S15500

3 Key Processing Information

3.1 Typical Post Heat Treatment Properties (MetcoAdd 15-5PH-A) ^{a, b, c}

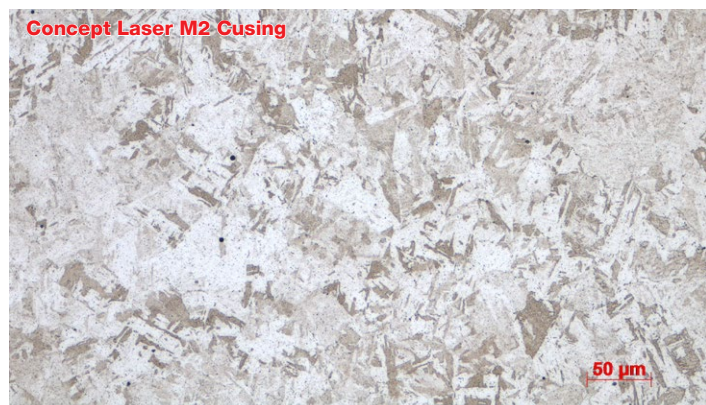
Specification		Concept Laser M2 Cusing	EOS M290
Ultimate Tensile Strength (MPa), XY/Z	ASTM E8	1337 ± 9 / 1334 ± 2	1349 ± 5 / 1354 ± 4
Yield Strength (MPa), XY/Z		1205 ± 12 / 1206 ± 5	1224 ± 4 / 1235 ± 5
Elongation at break %, XY/Z		14 ± 1 / 12 ± 1	14 ± 1 / 12 ± 0
Hardness (VHN ₃₀₀)	ASTM E384-17	426 ± 7	426 ± 6
Relative Density %	Internal Specification	> 99.9%	> 99.7%

^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 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 Argon atmospheric heat treatment. Solutionize at 1038 °C (1900 °F) for 1 h. Air cool. Age at 492 °C (900 °F) for 1 h.

3.2 Post Heat Treatment Microstructure, Vertical Build Direction (MetcoAdd 15-5PH-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 15-5PH-A	1100782	10 lb (approx. 4.5 kg)	Stock	Global
MetcoAdd 15-5PH-B	1100783	10 lb (approx. 4.5 kg)	Special Order	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 50-1953 (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.