

Material Product Data Sheet

Spherical Cast Tungsten Carbide – Nickel - Chromium Boron Silicon Powder for Cladding and Weld Hardfacing

Powder Products: Metco 51019A

Patent WO 2019/087097

1 Introduction

Metco™ 51019A is a powder blend consisting of a bi-modal distribution of spherical cast tungsten carbide and a nickel-based matrix. The high packing density of the hard phase that is achieved after deposition is a function of the design of the material. Larger and smaller, hard (2700 to 3100 HV0.1) spherical particles combine to form a narrow inter-carbide spacing or mean-free-path that reduces preferential matrix wear.

Metco 51019A applied using the Oerlikon Metco spray/fuse welding torch, Metco WT 1000, enables effective deposition of the entire particle size range. An increase of 20% in hard phase content, better deposition efficiency and reduced deposition time is enjoyed over other torches.

Application benefits have seen tool-life increase by over 300% when compared to conventional tungsten carbide containing hardfacings. Best protection is offered to regions of the part that are subjected to highly erosive fluids over a range of impingement angles. Part protection from medium stress rubbing and wear, through both two-body and three-body abrasion on the outside diameter or gage of a drill-bit is also promoted.

Matrix chemistry is designed to create a balance of hardness and ductility. The as-deposited matrix hardness (35 to 40 HRC), provides sufficient ductility and results in a low cracking propensity on deposition, after service and on repair.

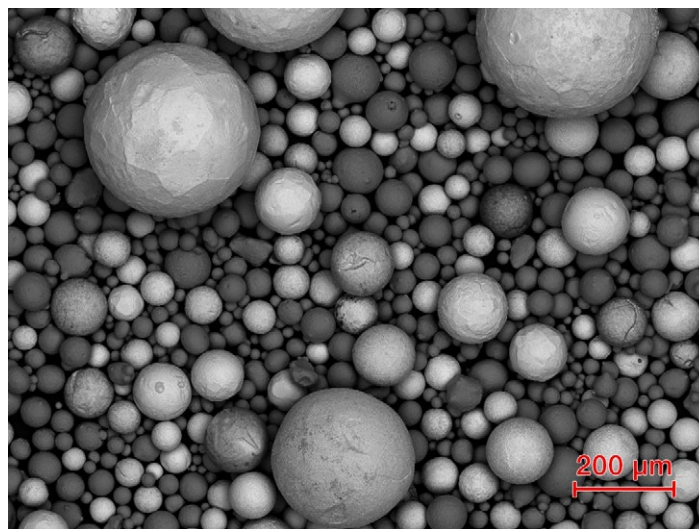
1.1 Typical Uses and Applications:

Typical industries and applications include:

- Oil and Gas downhole tools such as:
 - Steel-bodied drill bits
 - Hole openers
 - Bi-centered drill bits
 - Rotary steerable parts with inserts
 - Matrix drill lbit repair
- Mining equipment

Quick Facts

Classification	Carbide, tungsten-based
Chemistry	CTC-S/NiCrBSi
Manufacture	Gas atomized blend
Morphology	Spheroidal
Carbide Hardness	2700 – 3100 HV0.1
Matrix Hardness	35 – 40 HRC
Service Temperature	≤ 500 °C (930 °F)
Purpose	High abrasion and erosion resistance
Process	Spray Fuse Hardfacing, PTA



SEM of Metco 51019A tungsten carbide blend

- Agricultural tools such as:
 - Plowshares
 - Lifting shares
 - Harvester blades
 - Shear bars
- Chipper knives
- Decanter screws
- Tailing pipelines

Important: Metco 50141A must be applied using the WT1000 torch. Please contact your Oerlikon Metco Account Representative for more information.

2 Material Information

2.1 Chemical Composition and Particle Size Distribution

Product	Weight Percent (nominal)		Nominal Particle Size Distributions
	CTC-S (WC Hardphase)	NiCrBSi Martix	
Metco 51019A	60	40	-355 +20

Size analysis using sieve (ASTM B214).

2.2 Other Characteristics

Product	Morphology	Manufacturing Method	Color
Metco 51019A	Spherical	Atomization and Blending	Grey

2.3 Recommended Process

Product	PTA	Spray and Fuse Powder Brazing
Metco 51019A	✓	✓

2.4 Key Selection Criteria

- Choose Metco 51019A for extreme resistance to abrasion or erosion.
- Metco 51019A can be applied in shop (PTA) or on-site (spray and fuse).

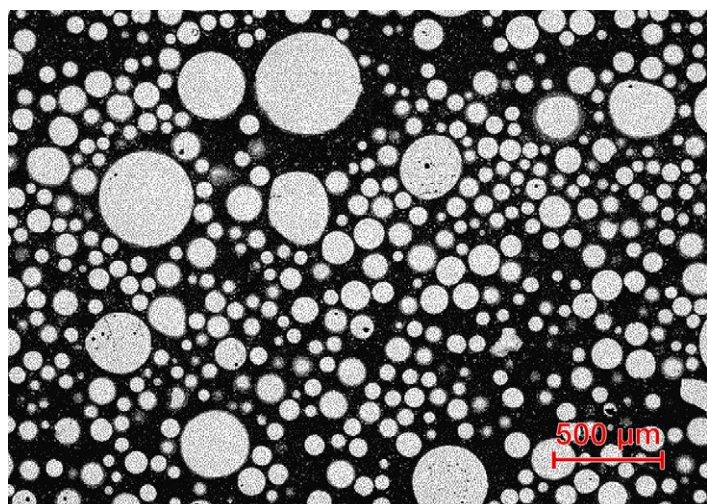
2.5 Related Products

- Metco 81586 (formerly Xtreme Elite) is a diamond containing composite rod for high abrasion resistance, when a rod form is preferred.

- Metco 51151B (formerly Xtreme Elite) is a spray and fuse diamond containing powder for high abrasion resistance.
- Metco 81022 (formerly Enduro Elite+) is a composite rod for high erosion resistance when a rod form is preferred.
- Nickel spray powder with a hardness of 40 HRC and a particle size of 106 µm (-140 mesh) is used as a buttering layer powder to prevent oxidation to the part prior to hardfacing.

3 Deposit Information

3.1 Typical Overlay Cross-Section



3.2 Welding / Cladding Parameters

Clean the part with a suitable blast media. Preheat to approximately 150 °C (300 °F), using a muffle furnace, propane burner or induction coil. Apply a nickel buttering layer such that the surface of the part is still discernible. Heat the part to about 500 to 550 °C (930 to 1025 °F) using a propane torch, furnace or induction coil. Using the Metco WT1000 torch, spray and fuse the areas requiring surface protection. Slowly cool under a blanket after deposition.

3.3 Recommend welding torch

Important: Metco 50141A must be applied using the WT1000 torch. Please contact your Oerlikon Metco Account Representative for more information.

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 51019A	1303871	1 lb (approx. 0.45 kg)	Stock	Global

4.2 Handling Recommendations

- Store in the original closed container in a dry location.
- Tumble contents prior to use to prevent segregation.
- Open containers should be stored in a drying oven to prevent moisture pickup.

4.3 Safety Recommendations

See the SDS 50-2440 (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).