

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 Metco Joining & Cladding 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.

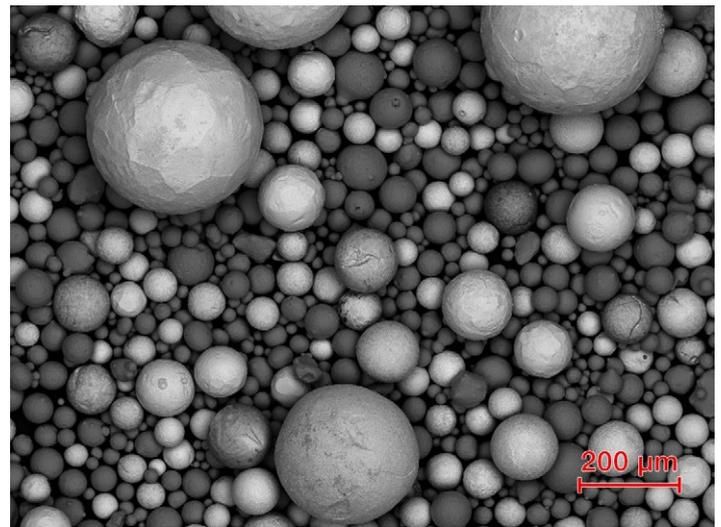
1.1 Typical Uses and Applications:

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 bit 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	Oxy-Acetylene Welding, 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 51019A must be applied using the WT1000 torch. Please contact your Metco Joining & Cladding 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 µm

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	Oxy-Acetylene Welding
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

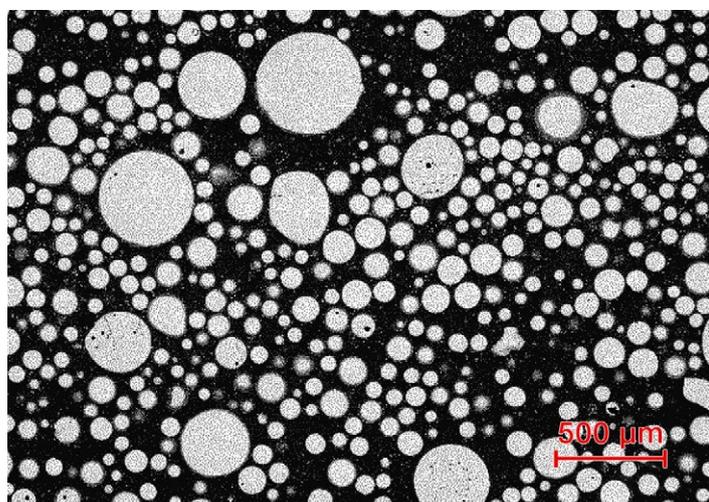
2.5 Related Products

- 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.

3.3 Recommend welding torch

Important: Metco 51019A must be applied using the WT1000 torch. Please contact your Metco Joining & Cladding 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.metcojoiningcladding.com (Resources – Safety Data Sheets).