

Material Product Data Sheet

Tungsten Titanium Carbide Material for Blending

Powder Products: Metco™ 50201A

1 Introduction

Metco 50201A is a tungsten titanium carbide (WTiC) powder produced by a melting process and subsequent crushing that results in powder particles having an angular shape. It can be used in powder blends with alloys of nickel, cobalt or iron as a hard phase filler material for PTA or laser cladding deposits.

Metco 50201A has better chemical stability in highly alloyed nickel and iron matrix materials and with reduced dissolution compared to tungsten carbide. Hence, the amount of brittle secondary precipitates are limited and matrix embrittlement is eliminated. This, combined with this product's low corrosion rate in alkaline environments compared to tungsten carbide, makes Metco 50201A the preferred blend material for many applications.

When blending Metco 50201A, care should be taken in the type of matrix material chosen. Please see Section 2.2 for more information.

As Metco 50201A is approximately 35 to 40 % lighter than tungsten carbide, it is an excellent choice for weight-sensitive situations.

The impact resistance of coatings created with Metco 50201A rivals that of spherical cast tungsten carbide. Wear resistance is as good as that of tungsten carbide. There is a very broad range of applications where Metco 50201A would be the best choice.

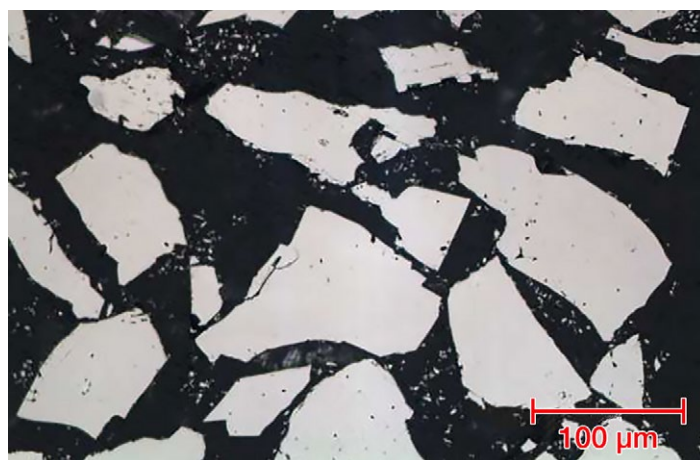
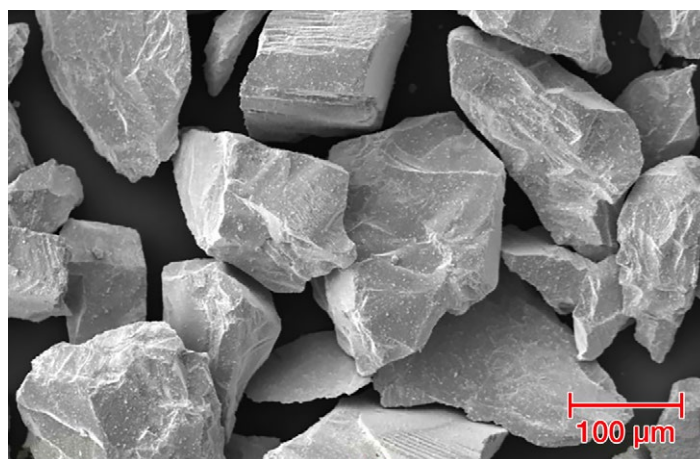
Due to its good thermal stability, Metco 50201A is also suitable as a filler for cored wires used for hardfacing applications.

1.1 Typical Uses and Applications:

- Ground engaging tools
- Wear plates for construction and mining equipment
- Classification screens
- Mining crushers and milling machines
- Mixer blades, decanter screws and extruder screws for heavy machinery applications
- Non-magnetic directional tools and stabilizers for down hole drilling

Quick Facts

| | |
|------------------------|--|
| Classification | Carbide, tungsten-titanium based |
| Chemistry | WTiC |
| Manufacture | Fused and Crushed |
| Morphology | Angular |
| Particle Density | 9.5 to 10.5 g/cm ³ |
| Microhardness (grains) | 2700 to 3000 HV0.1 |
| Service Temperature | ≤ 500 °C (930 °F) |
| Purpose | Hard phase blend component for wear resistance |
| Process | PTA, Laser Cladding |



Top: Outer morphology of Metco 50201A powder. Bottom: Inner structure of Metco 50201A powder.

2 Material Information

2.1 Technical Data

| Product | Chemistry (wt %) | | | Nominal Particle Size Distribution | Manufacturing Method | Recommend Processes |
|--------------|------------------|---------|-----------|------------------------------------|----------------------|---|
| | W | Ti | C | | | |
| Metco 50201A | Balance | 20 – 23 | 7.2 – 8.7 | -150 +53 µm | Fused and Crushed | Blend material for PTA and Laser Cladding |

Particle size analysis using sieve in accordance with ASTM B214

2.2 Key Selection Criteria

- Metco 50201A is a premium hard phase matrix product that can be used in applications where tungsten carbide cannot be used or has problems such as with iron alloy matrices or highly alloyed nickel- or cobalt-based matrices.
- Metco 50201A can be used as a hard phase filler component in conventional welding composite wires.
- Metco 50201A is non-magnetic making this an excellent hard phase when blended and welded with a non-magnetic matrix such as the Metco 1625 series (similar to Inconel 625) for directional drilling applications.
- Choose Metco 50201A as a blend material instead of a tungsten carbide blend material when:
 - Better hard phase corrosion resistance is needed, particularly in alkaline environments where tungsten carbide fails.
 - A hard phase material with reduced dissolution into the matrix is needed.
 - Weight reduction compared to tungsten carbide deposits is desirable, such as for thicker deposits on rotary parts.
 - A hard phase with the hardness and impact resistance equivalent to spherical cast tungsten carbide is needed.
 - A hard phase material with better hardness retention after cladding than other carbide-bearing materials (see comparison chart).
- When blending Metco 50201A, a ratio of 35 to 65 wt.% of Metco 50201A to matrix material is recommended.
- Best choices for blend materials for Metco 50201A are Metco 1625B, Metco 1030A, Metco 1040A, Metco 1051A, MetcoClad 316L-SI.
- Metco 50201A can be blended with nickel-based self-fluxing alloys when used for low-heat input overlay processes such as laser cladding, such as Metco 15E,

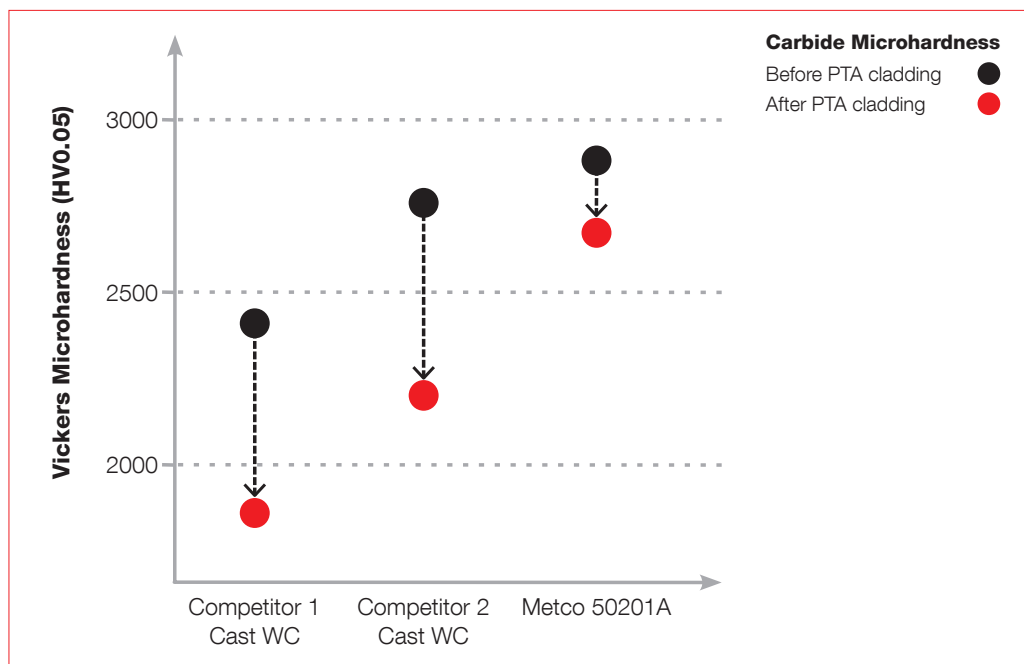
Metco 16C-NS or Metco 12C, Metco 14E, Metco 7010 or Amdry 7050. These blends are not recommended for PTA processing

- When choosing Metco 50201A for non-magnetic directional drilling, be sure to choose a non-magnetic matrix material such as Metco 1625B, Metco 1040A or MetcoClad 316L-SI.
- Metco 50201A is not recommended for deposits using spray and fusing.

2.3 Related Products

- We can provide a wide-range of corrosion-resistant materials to blend with Metco 50201A. Please contact your Account Representative for more information.
- We provide a wide range of tungsten carbide hard phase blend materials including cast and crushed, spherodized cast and crushed, macrocrystalline, cemented pellets, sintered and crushed and tetrahedral cemented carbides.
- Pre-blended products (hard phase plus matrix) are also available with a variety of carbide types, matrix chemistries, blend ratios and particle size distributions.
- Wire and powder products for conventional welding, PTA and laser cladding processes are available having unique chemistries that form hard phases during deposition of the surfacing material. In general, these products produce a fine, homogeneous microstructure with very good abrasion and impact resistance for a variety of substrates.
- Rods, sintered or dipped electrodes with carbide hard phase are also available for conventional welding applications.

Please contact your Account Representative for more information on these products.



3 Coating Information

3.1 Key Overlay Characteristics

- Metco 50201A is a blend component and cannot be deposited alone. It is recommended for PTA (Plasma Transferred Arc) welding and Laser Cladding but it can be also used as a filler for cored wires used for hardfacing.
- The blend ratio is typically 60 wt % of Metco 50201A and 40 wt % of the metal alloy matrix, but ratios as low as 35 wt. % can be used, as well. The material is best deposited with a reducing plasma and/or carrier gas such as Ar 5 %

H₂ and a higher heat input compared to tungsten carbide powder blends.

- Due to its better thermal stability and lower dissolution susceptibility it is less sensitive to variation of welding parameters and provides more robust outcome.
- Its lower density reduces its sinking behavior in a weld pool compared to tungsten carbide.

4 Commercial Information

4.1 Ordering Information and Availability

| Product | Order No. | Package Size | Availability | Distribution |
|--------------|-----------|----------------------|---------------|--------------|
| Metco 50201A | 1301043 | 5 kg (approx. 11 lb) | Special Order | Global |

4.2 Handling Recommendations

- Store in the original container in a dry location.
- Tumble contents prior to use to prevent segregation.
- Remove desiccant bag prior to use, where applicable.
- Open containers should be stored in a drying oven at temperatures below 38 °C (100 °F) to prevent moisture pickup.

4.3 Safety Recommendations

See the SDS 50-2130 (Safety Data Sheet) localized for the country where the material will be used. SDS are available from the Metco Joining & Cladding web site at www.metco-joiningcladding.com (Resources – Safety Data Sheets).