

## Material Product Data Sheet

### Sintered or Cemented and Crushed Tungsten Carbide Cobalt Materials for Hard Face Applications

#### Powder Products:

**Metco 50002A, Metco 50075A**

#### 1 Introduction

Metco™ tungsten carbide cobalt materials having a tightly controlled irregular, blocky shape. Particle size distributions are also strictly regulated. These sintered and crushed tungsten carbide (SCTC) materials are wet easily during surfacing and deposits containing these materials are tough, resist abrasion and tolerant of bending stresses.

These products can be blended as a hard-phase component in matrices of nickel-, cobalt- or iron-based self-fluxing alloys using a blend ratio of 30 to 60 % hard phase for PTA, laser cladding, spray and fuse<sup>a</sup> or powder welding applications.

Metco 50002A is a cemented tungsten carbide cobalt material with highly stable carbides that resist dissolution and phase transformation during processing versus Metco 50075A. It is recommended for PTA processing.

Metco 50075A is a premium material with a tightly controlled chemistry and reduced impurities. It will give the most consistent deposit results and is recommended for spray and fuse applications. It has good resistance to dissolution and phase transformation during processing.

Both of these materials produce deposits with minimal embrittlement of the matrix alloy and deposits are crack-free, depending on the parameters and process used.

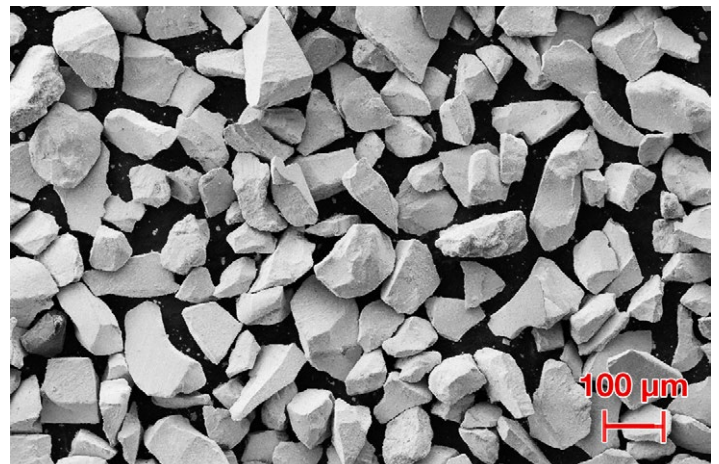
These SCTC powders are comparable to CTCP powders with respect to ductility and hardness.

#### 1.1 Typical Uses and Applications:

- Construction equipment wear plates
- Tunnelling machinery
- Agricultural harvester blades and wear plates
- Mining equipment crushers, classification screens and wear plates
- Heavy equipment mixer blades

#### Quick Facts

Classification	Carbide, tungsten-based (SCTC)
Chemistry	WC 6Co or WC 8Co
Manufacture	Sintered or Cemented and crushed
Morphology	Blocky and Irregular
Apparent Density	6.0 – 9.0 g/cm <sup>3</sup>
Bulk Density	14 – 15 g/cm <sup>3</sup>
Hardness	≥1900 HV0.1
Service Temperature	< 600 °C (1100 °F)
Purpose	Hard phase blend component for wear resistance, impact resistance and cutting
Process	Spray and fuse <sup>a</sup> , powder welding, PTA, laser cladding



Typical SEM photomicrographs. Top: exterior blocky / irregular morphology. Bottom: fully dense interior structure.

<sup>a</sup> Combustion Powder Thermal Spray followed by post-coat fusing

## 2 Material Information

### 2.1 Chemical Composition

Product	Chemical Composition (nominal wt.%)							
	W	Co	C	Fe	Cr	Ni	Ti	Total All Other
Metco 50002A	Balance	6.5 – 10.0	5.4 – 6.1	1.2 (max)	1.2 (max)	1.2 (max)	0.3 (max)	1.2 (max)
Metco 50075A	Balance	5.0 – 7.5	5.4 – 6.1	1.2 (max)	1.2 (max)	1.2 (max)	0.15 (max)	0.6 (max)

### 2.2 Particle Size Distribution, Manufacturing Method and Density

Product	Nominal Particle Size Distribution	Manufacturing Method	Nominal Apparent Density Range (g/cm <sup>3</sup> )
Metco 50002A	-106 +45 µm	Cemented and Crushed	6.0 – 9.0
Metco 50075A	-106 +45 µm	Sintered and Crushed	

- Analysis for particle sizes 45 µm and below determined by laser diffraction (Microtrac); determination above 45 µm by sieve analysis in accordance with ASTM B214, including the use of this methodology for particle sizes above 850 µm
- Other particle size distributions are available on request

### 2.3 Recommended Hardfacing Process

Product	Laser Cladding	PTA	Spray and Fuse	Powder Welding
Metco 50002A	●	◐	◐	●
Metco 50075A	●	◐	●	●

● = Recommended process; ◐ = Acceptable process. See Section 2.4 for further information.

### 2.4 Key Selection Criteria

- All materials are sintered and crushed.
- Choose the material most appropriate for the surfacing process to be used and the surface characteristics desired.
- These materials offer good erosion resistance. To further enhance the erosion resistance of the deposit, blend the material with a coarser material.
- Deposits of Metco 50075A offer higher hardness and abrasion resistance than deposits of Metco 50002A, based on, ASTM G65 testing.
- Metco 50002A and Metco 50075A are recommended for spray and fuse or powder welding in combination with other types of carbide powders.
- Metco 50002A and Metco 50075A can be used as a blend component with a self-fluxing alloy for laser cladding and PTA applications to produce dense and homogeneous overlay structures.
- Metco 50075A has a tighter chemical composition and lower impurities. Choose this material when consistent deposit results are critical. It is also the product of choice for spray and fuse applications as its lower titanium levels will produce better flow and reduced overlay porosity.
- When laser cladding these materials, care should be taken to minimize cracking within the deposit. A recommended matrix is Metco 7003. Contact Oerlikon Metco for further recommendations.

### 2.5 Related Products

- Oerlikon Metco offers a variety of other tungsten carbide products appropriate for use as blend materials. These include cemented tungsten carbide pellets (CTCP), fused tungsten carbide (CTC), spheroidized fused tungsten carbide (CTC-S), and monocrystalline tungsten carbide (MTC). Please review their respective datasheets for further information and their appropriate use for various surfacing processes.
- Oerlikon Metco also offers pure chromium carbide products that can be used as a blend materials for higher temperature applications, or when additional corrosion resistance is needed.
- In addition to blend materials, Oerlikon Metco offers a wide range of carbide-containing hard facing products for use with various processes. Please see the appropriate datasheet or contact your sales representative for more information. These products include:
  - Spray and fuse products applied using thermal spray processes that contain tungsten carbide with a nickel-based, self-fluxing alloy matrix, such as Metco 36C, Metco 31C-NS, Metco 32C, Metco 34F and WOKA 7703, among others.
  - Ready-to-use blends of carbide hard phase and self-fluxing matrix materials for PTA and laser cladding.
  - A variety of carbide-containing tubular rods for oxy-acetylene welding, as well as carbide-containing electrodes, wires and flexible rope for arc welding.

### 3 Coating Information

#### 3.1 Key Overlay Characteristics

Characteristic	Data
Microhardness <sup>a</sup> SCTC    HV0.1	≥ 1900
Hardphase / Matrix Blend Ratio	30 to 60 %

- Overlays containing SCTC could have lower hardness compared to other tungsten carbide types, but offer strong abrasion resistance in combination with very good impact resistance.
- As a result of low dissolution during processing, deposits containing SCTC produce nearly crack-free welds without embrittlement of the matrix alloy.
- Metco 50002A and Metco 50075A wet easily to the substrate and /or the matrix.
- SCTC materials may be blended with spheroidal carbide types to prevent settling of the carbides during processing.

### 4 Commercial Information

#### 4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 50002A	1501839	5 kg (approx. 11 lb)	Stock	Global
Metco 50075A	1501838	5 kg (approx. 11 lb)	Stock	Global

#### 4.2 Handling Recommendations

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

#### 4.3 Safety Recommendations

See the SDS (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](http://www.oerlikon.com/metco) (Resources – Safety Data Sheets).

Product	SDS No.
Metco 50002A	50-2570
Metco 50075A	50-2572