

Material Product Data Sheet

Spherical Cast Tungsten Carbide – Nickel Alloy Powder Blends

Powder Products:

Metco 51060A, Metco 51059A, Metco 51058

1 Introduction

Metco™ 51060A, Metco 51059A and Metco 51058 are 60/40 blends of spherical, cast tungsten carbide (CTC-S) and self-fluxing matrix materials. This combination of a very hard phase material (tungsten carbide) and a corrosion resistant matrix results in a product that is suitable for laser cladding or PTA deposits that resist erosion from particulates in slurries.

The metallic matrix constituent of the blend is gas atomized that ensures chemical homogeneity and a spherical morphology. All three products employ a nickel chromium silicon boron matrix; however, Metco 51059A has a higher chromium content for better corrosion and erosion resistance and improved flow. Metco 51058 has a coarser particle size distribution and provides excellent protection against high-stress abrasion for stabilizer applications.

The tungsten carbide constituent is manufactured using a unique process that results in a fine non-acicular structure with greater hardness and superior hardness compared to that of conventional fused and crushed tungsten carbide. The high apparent density and improved flow raise the amount of hard phase material present in the clad deposit.

1.1 Typical Uses and Applications:

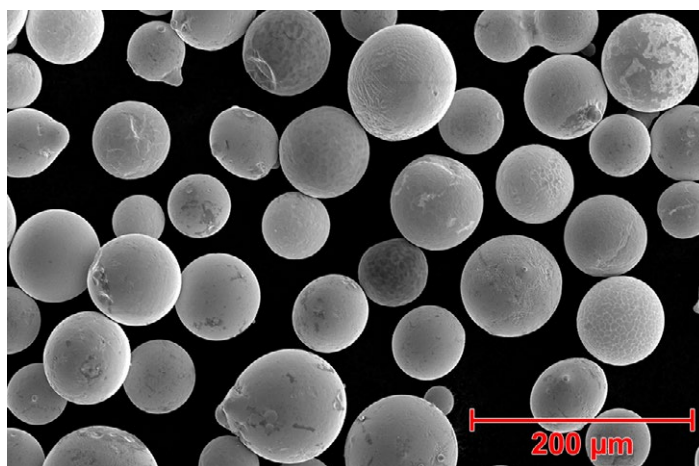
- Down hole tools such as stabilizers and drill collars
- Slurry pump impellers
- Conveyor and extruder screws used for manufacturing of plastics or ceramics
- Agricultural shearing blades
- Drill collars and tool joints used for oil exploration and drilling equipment

These materials can be used to coat substrates of:

- Mild steel
- Stainless steel
- Nickel alloys
- Heat-treatable steels when preheated to 300 °C (570 °F) to avoid extensive cracking in the deposit

Quick Facts

Classification	Carbide blend
Chemistry	WC 40(NiCrSiBC)
Manufacture	Gas atomized blend
Morphology	Spheroidal
Service Temperature	≤ 500 °C (930 °F)
Apparent Density	6 – 8 g/cm ³
Hardness	2700 – 3100 HV0.1
Purpose	Wear and erosion resistance
Process	Laser Cladding, PTA



Typical Morphology of Metco 51060A Powder Blend

2 Material Information

2.1 Chemical Composition

Product	Weight Percent (typical)								
	Hard Phase 60 %			Metal Matrix 40 %					
	W	C	Fe	Ni	Cr	Si	B	Fe	C
Metco 51060A	Balance	3.8	< 0.3	Balance	6.8 – 8.3	3.1 – 3.9	1.4 – 1.9	1.7 – 3.3	0.1 – 0.4
Metco 51059A	Balance	3.8	< 0.3	Balance	9.5 – 12.5	3.4 – 4.3	1.9 – 3.6	2.1 – 3.5	0.3 – 0.6
Metco 51058	Balance	3.8	< 0.3	Balance	6.8 – 8.3	2.8 – 3.6	1.4 – 1.9	1.7 – 3.3	0.1 – 0.4

2.2 Particle Size Distribution, Apparent Density and Former Designation

Product	Nominal Particle Range (µm)	Apparent Density (g/cm ³)	Former Product Designation
Metco 51060A	-106 +45	6.0 – 8.0	MetcoClad 52052
Metco 51059A	-106 +45	6.0 – 8.0	WOKA 6050S PlasmaDur 53003 MetcoClad 53003
Metco 51058	-150 +53	6.0 – 8.0	---

Size analysis using sieve (ASTM B214).

2.3 Key Selection Criteria

- All three products are suitable for applications where high hardness, wear resistance and resistance to slurry erosion is needed.
- These are versatile products that can be used in both PTA and laser cladding processes thanks to its size and the use of the spherical carbide.
- Metco 51058 is particularly suitable for PTA processing due to its coarser size distribution.
- Metco 51060A produces overlays with better impact resistance compared to overlays of Metco 51059A.
- Metco 51059A weld overlays have a matrix hardness of approximately 50 HRC which provides very good abrasion and erosion resistance with fair impact resistance.

2.4 Related Products

- Oerlikon Metco offers a wide variety of tungsten carbide wear-resistant coating materials. Please refer to our materials guides or contact your Oerlikon Metco Sales Representative for more information on available products.
- Alternative overlays applied using the PTA welding processes can be achieved using PlasmaDur 51937.
- PlasmaDur 51022 and PlasmaDur 51027 contain the

same matrix alloy as Metco 51059A, but feature a fused and crushed tungsten carbide with lower hardness.

- Metco 50050A, which is the carbide hard phase constituent of Metco 51060A and Metco 51059A, can be purchased by customers who wish to use their own custom matrix alloy for laser cladding, or mix and create blends in different ratios.
- Where spray and fuse applications suffice, WOKA 53025 and WOKA 53045 use fused tungsten carbide that provides very good abrasion resistance characteristics. WOKA 53025 shows excellent weldability producing a crack-free, highly impact resistant deposits while deposits made from WOKA 53045 exhibit high erosion resistance.
- Spray and fuse products that contain tungsten carbide with a nickel-based self-fluxing alloys matrix include Metco 36C, Metco 31C-NS, Metco 34F and WOKA 7703, among others. These materials are applied using thermal spray processes.
- Nickel- and cobalt-based self-fluxing alloys without hard phase that are thermal sprayed and subsequently fused materials include Metco 12C, Metco 14E, Metco 18C and other products. These materials form fully dense coatings with good corrosion resistance.

2.5 Recommended Processes

Product	Laser Cladding	PTA
Metco 51060A	✓	
Metco 51059A	✓	
Metco 51058	✓	✓

Note: Customers should feel free to use any of these materials for either laser cladding or PTA. The above recommendations are made on material design considerations. Customers may use these products for processes other than laser cladding or PTA, if they should choose to do so.

3 Coating Information

3.1 Key Overlay Characteristics

Characteristic			Metco 51060A	Metco 51059A	Metco 51058
Recommended Coating Process			Laser Cladding	Laser Cladding	Laser Cladding or PTA
Microhardness	CTC-S	HV0.1	2700 – 3100	2700 – 3100	2700 – 3100
Hardness	Matrix	HRC	37 – 44	50 – 55	37 – 44
Hardphase / Matrix Blend Ratio	%		60 / 40	60 / 40	60 / 40

All values reported are nominal.
Thickness limitations are dependent on application parameters and hardware.

3.2 Welding Parameters

Please contact your local Oerlikon Metco Account representative for the availability of starting laser cladding or PTA welding parameters. For specific application needs, Oerlikon Metco can provide parameter advice and parameter development services may be available.

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 51060A	2284703	5 kg (approx. 11 lb)	Stock	Global
Metco 51059A	1511221	5 kg (approx. 11 lb)	Special Order	Global
Metco 51059A	1511227	25 kg (approx. 55 lb)	Special Order	Global
Metco 51058	1306774	10 kg (approx. 22 lb)	Stock	Global

4.2 Handling Recommendations

- Store in the original 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 Data Sheets

See the refer to 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 (Resources – Safety Data Sheets).

Product	SDS No.
Metco 51060A	50-1521
Metco 51059A	50-1245
Metco 51058	50-2365

Information is subject to change without prior notice.