

Material Product Data Sheet

Sustainable Hardfacing Monocrystalline – Cast and Crushed Tungsten Carbide – Nickel – [Chromium] Boron Silicon Powder Blends

Powder Products:

Metco 50141A and Metco 50142A

1 Introduction

Sustainable, low environmental impact wear solutions are key to Oerlikon Metco's green strategy. Technological advancements enable significant reductions in carbon emissions in the development, production and use of these materials. These environmental benefits are contained within wear-solutions resulting in solutions with a high value proposition.

Sustainable hardfacings dramatically decrease the carbon emissions created in the production of conventional materials. Based on our internal carbon footprint analysis, the production of 10 kg of our sustainable hardfacing emits 3620 kg less CO₂ than typically manufactured material. According to the greenhouse gas equivalency calculations posted on the website of the United States Environmental Protection Agency (EPA), 3620 kg CO₂ is equivalent to gas emissions from the consumption of 1541 l (407 gal) of gasoline, burning of 1809 kg (3989 lb) of coal, charging of 461667 smartphones, or 61.3 % electricity use of a home for one year.

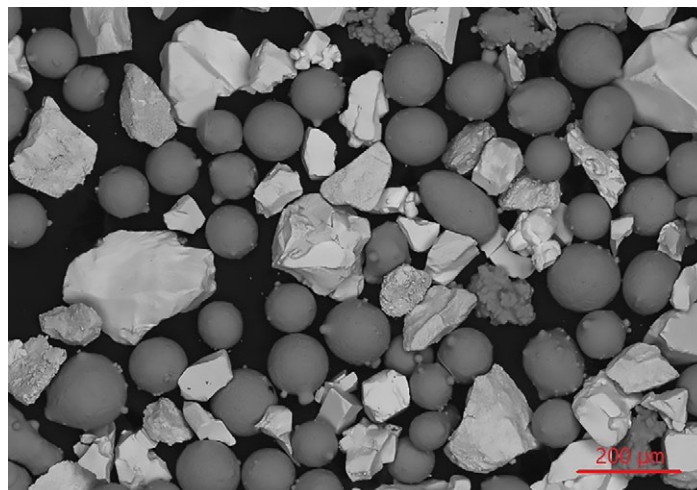
Another advantage of the sustainable hardfacings is the economic benefit. Hardfacings of these materials will provide equivalent low stress abrasion resistance to conventionally produced materials with a lower cost variance associated with fluctuating metal markets.

The sustainable tungsten carbide is a mix of monocrystalline tungsten carbide (MTC) in majority and crushed cast tungsten carbide (CTC) in minority, blended in a self-fluxing alloy. The high thermal stability feature of MTC leads to low carbide dissolution during the deposition, resulting in the decrease of brittle phases in the metal matrix.

Metco 50141A is designed to be used with the spray and fuse welding process. Properly applied, the high fraction of metal matrix provides a crack-free hardfacing with good impact resistance. Metco 50142A is designed to be applied using PTA. Its chromium-free matrix, combined with the MTC results in a good fusion and impact resistant deposit. Both hardfacings can achieve overlays with uniform distribution of tungsten carbide by using the appropriated equipment and parameters.

Quick Facts

Classification	Carbide, tungsten-based
Chemistry	(MTC+CTC)(Ni[Cr]BSi)
Manufacture	Blend
Morphology	Angular and Spheroidal
Service Temperature	≤ 500 °C (930 °F)
Purpose	Good abrasion and erosion resistance
Process	Spray Fuse Hardfacing, PTA



SEM of Metco 50141A showing typical outer morphology of these products

1.1 Typical Uses and Applications:

Typical industries and applications include:

- Metco 50141A:
 - Oil and gas downhole tools
 - Mining equipment
 - Agricultural plowshares, lifting shares, harvester blades and shear bars
 - Chipper knives, decanter screws and tailing pipelines
- Metco 50142A:
 - Oil and gas downhole tools
 - Excavator buckets for earth moving equipment
 - Agricultural shear bars, plowshares and lifting shares

2 Material Information

2.1 Chemical Composition and Particle Size Distribution

Product	Weight Percent (wt. % nominal)			Nominal Particle Size Distribution
	MTC/CTC WC Hardphase	NiCrBSi Martix	NiBSi Martix	
Metco 50141A	45	55	---	-250 +20
Metco 50142A	40	---	60	-250 +45

Size analysis using sieve (ASTM B214).

2.2 Other Characteristics

Product	Morphology	Manufacturing Method	Color
Metco 50141A	Angular and Spherical	Atomization, Agglomeration and and Blending	Grey
Metco 50142A			

2.3 Recommended Process

Product	PTA	Spray and Fuse Powder Brazing
Metco 50141A		✓
Metco 50142A	✓	

2.4 Key Selection Criteria

- Deposits of these products provide good wear resistance in low to medium stress abrasion and/or erosion environments.
- These products are an excellent choice for use on large parts where the economic consideration of the raw material is of paramount importance.
- Metco 50141A produces crack-free deposits with good impact resistance and weldability.
- Metco 50142A has a tough nickel, self-fluxing matrix that is free of chromium, leading to good impact resistance of the overlays.
- If thicker overlays are required, Metco 50142A applied

using PTA is a better choice over Metco 50141A applied using spray and fuse welding.

2.5 Related Products

- Woka 53025 is a spray and fuse welding material with a matrix alloy similar in composition to Metco 50141A. Woka 53025 deposits provide good high-stress abrasion resistance but has lower environmental and economic benefits.
- PlasmaDur 51027 is a PTA material with the same matrix composition as Metco 50142A. PlasmaDur 51027 provides good high-stress abrasion resistance but with lower environmental and economic benefits.

3 Deposit Information

3.1 Key Deposit Results

Product	Welding Process	Abrasion Resistance (ASTM G65A)
Metco 50141A	Spray and Fuse	1 st pass: 9.30 mm ³
Metco 50142A	PTA	1 st pass: 5.55 mm ³ 2 nd pass: 2.40 mm ³

3.2 Recommended Welding Torch (Metco 50141A)

Welding Process	Recommended Welding Torch
Spray and Fuse	WT1000

3.3 Welding Parameters

Please contact your Oerlikon Metco Account Representative for parameter availability. For specific coating application requirements, the services of Oerlikon Metco's Coating Solution Centers are available.

4 Commercial Information

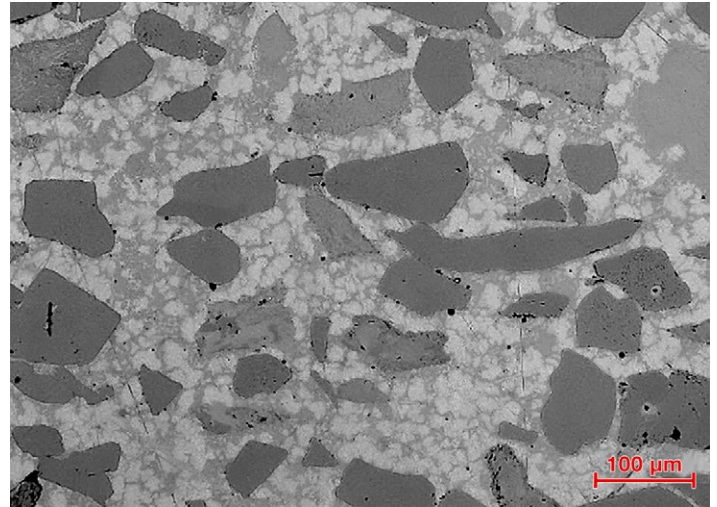
4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 50141A	2286527	5 kg (approx. 11 lb)	Stock	Global
Metco 50142A	1930834	5 kg (approx. 11 lb)	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.

3.4 Typical Overlay Cross-Section



Metco 50141A applied using the spray and fuse welding process

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 (Resources – Safety Data Sheets).

Product	SDS Index Number
Metco 50141A	50-2711
Metco 50142A	50-2712

Information is subject to change without prior notice.