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Material Product Data Sheet

Cast and Spherical Cast Tungsten Carbide / Nickel Boron Silicon Powder for Plasma Transferred Arc (PTA)

PTA Powder Products: PlasmaDur 51937

1 Introduction

PlasmaDur™ 51937 is a new PTA material that has already found great acceptance by industry. It contains cast tungsten carbide (CTC), spherodized cast tungsten carbide (CTC-S) and a gas atomized nickel-based self-fluxing alloy. The blended product is used as a hardface overlay.

The self-fluxing alloy reduces the heat input required to produce the weld thus minimizing the carbide dissolution. The blend of carbides improves the suspension of the carbides throughout the weld. This results in welds that have fewer voids and diluted zones, thus the welded overlays exhibit very consistent wear characteristics throughout their serviceable life.

Cast spherodized tungsten carbide provides an extremely hard compound to the coating. This content, combined with cast tungsten carbide content in the weld makes coatings of this material among hardest in the industry. The very high hardness translates to excellent abrasion wear with only fair impact resistant properties.

1.1 Typical Uses and Applications:

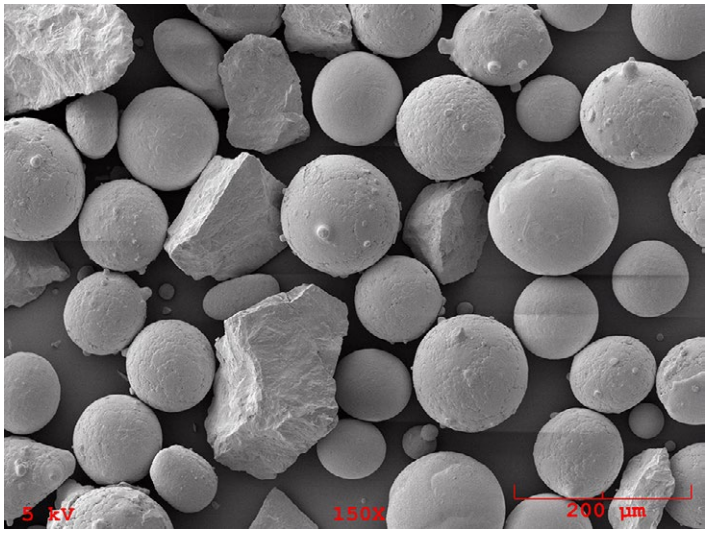
Typical industries and applications include:

- Oil exploration equipment
- Down-hole drilling tools

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 overlay

Quick Facts	
Classification	Carbide, tungsten-based
Chemistry	CTC / CTC-S / NiBSi matrix
Manufacture	Blend carbide: cast / matrix: gas atomized)
Carbide Hardness	CTC: 2000 – 2300 HV0.1 CTC-S: 2700 – 3100 HV0.1
Morphology	Carbide: angular and spheroidal Matrix: spheroidal
Apparent Density	6.0 – 6.7 g/cm^3
Flowability	Free-flowing powder
Service Temperature	< 500 °C (930 °F)
Purpose	Wear resistance
Process	PTA



SEM photomicrograph showing the morphology of PlasmaDur 51937 powder

2 Material Information

2.1 Chemical Composition

Product	Hard Phase Composition (wt.%)			Matrix Alloy Composition (wt.%)				
	Phase %	W	C	Phase %	Ni	B	Si	C
PlasmaDur 51937	60	95.8 – 96.5	3.5 – 4.2	40	Bal.	2.9 – 3.4	2.7 – 3.3	Trace

2.2 Particle Size Distribution, Apparent Density and Former Product Designation

Product	Nominal Particle Size Distribution (µm)	Nominal Apparent Density Range (g/cm^3)	Primary Carbide Grain Size
PlasmaDur 51937	–150 +63	6.0 – 6.7	Coarse

Other particle size distributions are available on request and can be tailored for on-site conditions and special applications.

2.3 Key Selection Criteria

- When used with the PTA process, PlasmaDur 51937 can be applied at high deposition rates, which makes PlasmaDur 51937 an efficient and cost effective material for overlay coatings.
- PlasmaDur 51937 contains cast and spherodized tungsten carbide. The spherodized tungsten carbide has the highest microhardness (2700 – 3100 HV0.1) available in carbides. The composite hardness is approximately 60 HRC, providing excellent abrasive wear resistance. The addition of spherical tungsten carbide adds ductility to the overall coating giving PlasmaDur 51937 somewhat unique properties.

2.4 Related Products

- Oerlikon Metco offers a wide variety of tungsten carbide wear-resistant coating materials for application using welding or thermal spray processes. Please contact your Oerlikon Metco Sales Representative for more information on available material choices.
- Oerlikon Metco PTA powders having a variety of alloy compositions blended with monocrystalline tungsten carbide include: PlasmaDur 51142, PlasmaDur 51122, PlasmaDur 51302 and PlasmaDur 51322. Of this group PlasmaDur 51122 would produce weld coatings most similar in composite hardness to PlasmaDur 51937.
- Where spray and fuse applications suffice, WOKA 53025 and WOKA 53045 contain cast tungsten carbide that provide very good resistance to abrasive wear. WOKA 53025 shows excellent weldability, producing a crack-free, highly impact resistant coating while coatings of WOKA 53045 exhibit high erosion resistance.
- Spray and fuse products that contain tungsten carbide with a nickel-based self-fluxing alloy matrix include Metco 36C, Metco 31C-NS Metco 34F and WOKA 7703, among others.

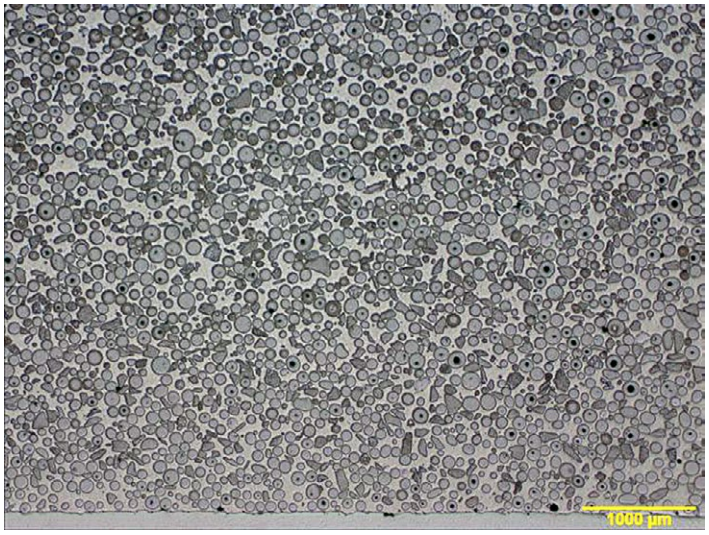
3 Coating Information

3.1 Key Overlay Characteristics

Characteristic			PlasmaDur 51937
Recommended Coating Process			Plasma Transferred Arc (PTA)
Microhardness	Spheroidized Cast Tungsten Carbide (CTC-S)	HV0.1	2700 – 3100
	Cast Tungsten Carbide (CTC)	HV0.1	2000 – 2300
Hardness	Composite	HRC	58 – 62
Hardphase / Matrix Blend Ratio			60 / 40
Thickness Limit*			none

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

3.2 Typical PTA Overlay Cross-section



3.3 Welding Parameters

Please contact your local Oerlikon Metco Account representative for the availability of starting 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
PlasmaDur 51937	1075337	25 kg (approx. 55 lb)	Special Order	Global

4.2 Handling Recommendations

- Store in the original, closed container in a dry location.
- Blend the entire contents of the container prior to use.

4.3 Safety Recommendations

See SDS 50-1508 (Materials 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 – Online Tools).

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