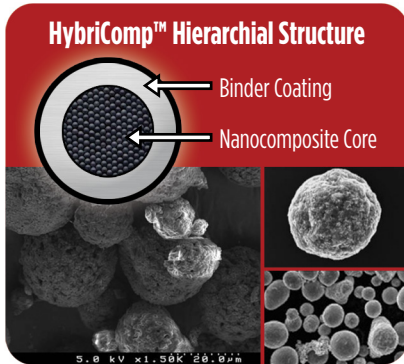


## 86WC 10Co 4Cr

HybriComp™s are cermets fabricated into a hierarchical structure, developed with microstructures engineered at the nano-, micro- and meso-scale to offer revolutionary performance and cost breakthroughs. These materials are formed with a nanocomposite core and binder coating, which are made using a combination of low friction, high wear resistance and excellent corrosion resistant materials. The nano-composite core provides high wear resistance, low friction and light weight; and the binders provide corrosion resistance, toughness, ductility, resiliency, and improved deposition efficiency. This combination results in a high toughness, ductile-phased toughened structure of high hardness tiles separated by ductile binder laminates.



### Near-Nano Composite Core

- High hardness and wear resistance
- Contains nano-dispersed friction modifiers
- Provides for fast machining

### Binder Coating

- Improves adhesion and efficiency
- Provides toughness and resiliency
- Provides corrosion resistance
- Prevents compositional changes



HybriComp™ cermet coatings can replace electrolytic hard chrome, electroplating, spray and fuse and thermal spray carbides; to impart wear and corrosion resistance, and reduce friction in sliding wear applications. Cermet coatings are easy and fast to apply, and machine to tight tolerances for dimensional restoration of OEM or worn E&P components. The HybriComp™ family of coating materials has been designed to act as drop-in replacements for thermal spray powders and will work with today's existing application systems.

## HybriComp Product Family

- **HybriComp™ T**  
Low friction, high corrosion and wear resistance
- **HybriComp™ W**  
High toughness, nano-composite carbide for extreme wear
- **HybriComp™ M**  
High resistance to liquid metal corrosion
- **HybriComp™ S**  
Low density, corrosion and spallation resistance

## Typical Applications

### Oilfield, Mining, Industrial, Automotive

- Low friction, high corrosion and wear resistance
- Half the cost of tungsten carbide

### Mining, Oilfield, Industrial, Aerospace

- High toughness for extreme wear resistance
- Lowest life cycle cost solution

### Galvanizing, Metal Processing

- High resistance to liquid/molten metal corrosion
- Lowest life cycle cost solution

### Aerospace

- Low density, corrosion and spallation resistant
- 40% the weight of carbides



## Value Proposition

### Performance

- 3-20X+ extended life of components
- Unique: Provides both hardness and toughness
- Environmentally friendly

### Cost

- Reduces downtime saving up to 10X the coating cost
- Significant capital cost savings due to reduced inventory needs
- Lowest life cycle cost solution

### Time

- Higher spray efficiency, easier to grind and finish – saves approximately 30% in coating and finishing time
- Drop in replacement for current thermal spray powders

## Introduction

Premium high toughness nano-engineered tungsten-carbide-cobalt (WC-Co) materials; have a high deposition efficiency (better yields, lower cost), and 5-7 times the ductility and toughness of conventional, micro-grain carbides. These materials are ideal for use in valve trim and seats on gate valves, sand erosion, and three body wear environments.

These powders are nano-structured ceramic-metal composites formed with a nanocomposite core and binder coating, utilizing a combination of high hardness, high wear resistance and excellent corrosion resistant materials. The nanocomposite core contains nano and near-nano size WC (Tungsten Carbide) particles in a hard, corrosion resistant binder. This core is encased in a protective cladding that minimizes the adverse effects of the HVOF straying process on the hard particles and helps form the coating's hierarchical structure. This combination results in a high-toughness, ductile-phased toughened structure of high hardness tiles separated by ductile binder laminates.

HybriComp™ W104 test results from our customers have shown 3-7 times the life in downhole applications over conventional materials, leading to the lowest coating life cycle cost in this segment.

## Snapshot

Characteristic	Data
Classification	Tungsten-carbide-cobalt
Chemistry	86WC 10Co 4Cr
Manufacture	Agglomerated and sintered
Morphology	Spheroidal
Purpose	Corrosion and wear resistance
Apparent Density	4 – 5.5 g/cm <sup>3</sup>
Service Temperature	Up to 500 °C (930 °F)
Process	HVOF

## Typical Applications

HybriComp™ W104 HVOF coatings replace electroplate hard chrome(EHC) in many industries including Oil & Gas downhole and pump components, mining, industrial, aerospace, etc. HybriComp™-W104 provides the ideal replacement for WC coatings, especially where additional wear resistance or ductility is required.

HybriComp™ W104 is an ideal replacement for Metco 5847-45, Metco 5163, Woka 3653, Woka 3655, Woka 3652 FC, Woka 3653 FC, Amperit 558 thermal spray powders, and offers longer-life at lowest life cycle cost compared to these thermal spray powders.

## Material Information

Chemical Composition					
	Weight Percent (Nominal)				
	W	Co	Cr	C (total)	Fe (max)
HybriComp W104	Bal.	9 - 11	3.5 – 4.5	4.5 – 5.5	0.3

Particle Size Distribution and Apparent Density			
HVOF System	Nominal Range (µm)	Primary Carbide Grain Size	Apparent Density (g/cm <sup>3</sup> )
DJ-5000	-38 + 10	200-400 nm	4.5 – 5.5
JP-5000	-45 + 15	200-400 nm	4.5 – 5.5

## Coating Information

Key Thermal Spray Coating Information	
Specification	Typical Data
Recommended Process	HVOF
Microhardness (HV0.3)	1300 - 1450
Wear Rate (ASTM G65 B)	Less than 2 mm <sup>3</sup>
Porosity	Less than 1 %
Corrosion Resistance	No corrosion after 1000 hrs in salt fog test
Maximum Service Temperature	500 °C (930 °F)
Coating Parameter Sheets	
Please contact us at <a href="mailto:sales@hybridmaterialsllc.com">sales@hybridmaterialsllc.com</a> to receive coating parameters for HVOF and HVAF spray guns.	

## Safety and Handling

### 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.

### Safety Recommendations

- Please contact us at [sales@hybridmaterialsllc.com](mailto:sales@hybridmaterialsllc.com) to receive the MSDS for this specific product for your country.