

# Material Product Data Sheet

## 99 % Nickel Powders for Thermal Spray

### Thermal Spray Powder Products: Metco 56VC, Metco 56C-NS

#### 1 Introduction

Metco™ 56VC and Metco 56C-NS are pure nickel powders that can be thermal sprayed to salvage and build up surfaces of worn or mis-machined nickel and nickel alloy parts. The produced coatings are hard, dense and readily machinable.

These products can be used instead of Monel for applications which require corrosion-resistant coatings that are slightly harder than Monel coatings, but with good machinability. They can be applied using either atmospheric plasma spray or combustion powder Thermospray™.

Metco 56VC is a coarser grade material of higher purity that can be used for speciality applications where a coarser particle size distribution is desired.

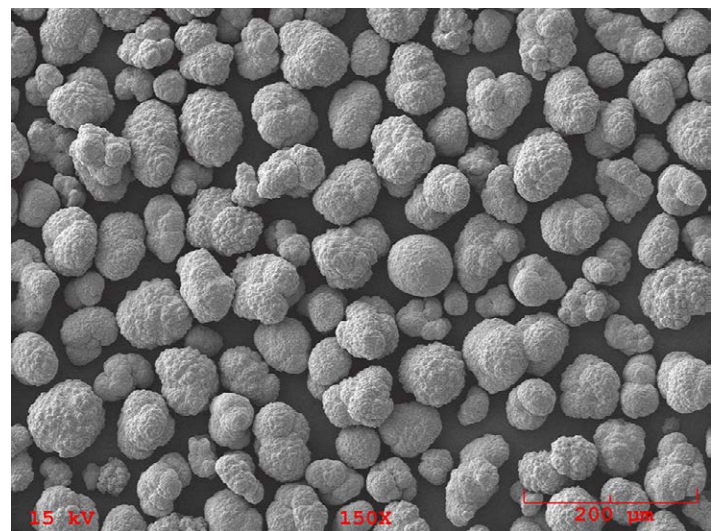
#### 1.1 Typical Uses and Applications:

Typically used for:

- Salvage and buildup of worn or mis-machined components made of nickel or nickel alloys

#### Quick Facts

Classification	Powder, pure nickel
Chemistry	99.3%+ Ni (typical)
Manufacture	Precipitated
Morphology	Globular
Apparent Density	approx. 3.4 g/cm <sup>3</sup>
Purpose	Salvage and restoration
Melting Point	1453 °C (2647 °F)
Process	Atmospheric Plasma Spray or Combustion Powder Thermospray™



SEM photomicrographs of Metco 56C-NS, showing morphology that is typical for these products.

## 2 Material Information

### 2.1 Chemical Composition, Particle Size Distribution and Manufacturing Method

Product	Chemical Composition (wt. %)	Nominal Particle Size Distribution (µm)	Manufacturing Method
	Ni (min)		
Metco 56VC	99.8	-150 +45	Precipitated
Metco 56C-NS	99.3	-75 +45	Precipitated

Particle size measured by sieve analysis.  
Other particle sizes are available on request.

### 2.2 Key Selection Criteria

- These products produce coatings that bond well to nickel and nickel alloy substrates, and are readily machined with carbide tools.
- Choose Metco 56VC when a coarser particle size is desirable or the somewhat higher purity of the material will enhance coating properties for the application.
- Coatings applied using the combustion powder Thermo-spray™ process have very high deposition efficiencies that can exceed 90 % whereas plasma sprayed coatings are typically in the range of 65 % – 80 %.
- Always choose the material that meets the customer material and process specifications.

### 2.3 Related Products

- Other products can also be used for salvage and build-up of nickel-based alloys such as Diamalloy 1005, Diamalloy 1006, Amdry 1718 and Diamalloy 4004NS.
  - These products are applied using the HVOF spray process and have different coating properties from those of Metco 56C-NS. The HVOF coatings generally have higher bond strengths (>69 MPa / 10000 psi), high corrosion resistance and high temperature capability.
  - They are appropriate for use on superalloy components such as substrates of Inconel 625, 717, 718 and Rene 80. They should be used when higher service temperatures (≤ 800 °C / 1470 °F), better corrosion resistance and stronger coatings are required that cannot be achieved using pure nickel coatings.
- Amdry 1718 can be applied using liquid-fuel HVOF, gas-fuel HVOF or atmospheric plasma spray.

### 2.4 Customer Specifications

Product	Customer Specification
Metco 56C-NS	Rolls-Royce OMAT 3/144 Rolls-Royce plc MSRR 9513 Williams WIMS 622

## 3 Coating Information

### 3.1 Key Thermal Spray Coating Information

Specification		Atmospheric Plasma Spray	Combustion Powder Thermo-spray™
		Macrohardness	HRB
Microhardness	HV0.1	125 – 170	125 – 150
Density	g/cm <sup>3</sup>	7.2	7.2
Porosity	vol. %	< 1	< 1
Bond Strength	MPa	14 – 31	N.R.
	psi	2000 – 4500	N.R.
Recommended Machining		Easily machined using carbide tools, light cuts and high work speeds	

N.R. = Not Reported

Note: Coating data is given for Metco 56C-NS. While specific coating data is not available for Metco 56VC, many properties will be similar. However, coating density should be somewhat lower and porosity higher.

### 3.2 Coating 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.

### Recommended Spray Guns

Combustion Powder	Atmospheric Plasma
Metco 6P-II series	Metco 3MB series
Metco 5P-II	Metco 9MB series

## 4 Commercial Information

### 4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 56VC	1074921	25 kg (approx. 55 lb)	Special Order	Global
Metco 56C-NS	1000364	5 lb (approx. 2.25 kg)	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 at temperatures below 38 °C (100 °F) to prevent moisture pickup.

### 4.3 Safety Recommendations

See SDS 50-120 (Safety Data Sheet) in the localized version applicable to 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).

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