oerlikon
metco

Material Product Data Sheet
Aluminum Oxide 13 % Titanium Dioxide Powders

Powder Products:
Amdry™ 6220, Amdry 6224, Amdry 6228,
Metco™ 130, Metco 130SF, Metco 6221

1 Introduction

Powders consisting of alumina and 13 % titania (nominal) are designed to produce dense, extremely wear resistant ceramic coatings that can be ground to excellent finishes.

Coatings of these materials generally have higher toughness, but lower hardness, dielectric strength and relatively less resistance to chemical attack than coatings of alumina 3 % titania or pure alumina. Coatings can be used at operating temperatures up to 540 °C (1000 °F).

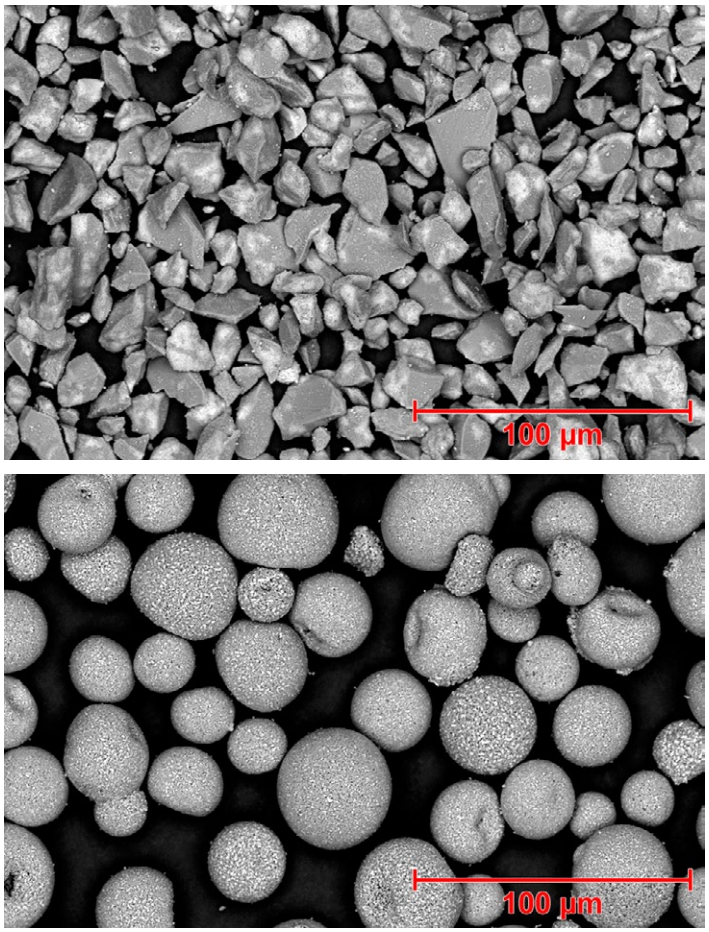
These materials are made using various manufacturing methods which, to some extent, differentiate their use in certain applications.

Metco 6221 is a new agglomerated and sintered material. It has excellent flow and exhibits significantly better deposit efficiencies, even at high feed rates. Therefore, Metco 6221 produces excellent coatings while bringing potential cost benefits in terms of reduced processing time.

1.1 Typical Uses and Applications

- Hydraulic parts
- Plungers
- Automotive parts
- Textile manufacturing components and tooling
- Components for the chemical industry
- Electrical insulation and dielectric applications

Quick Facts	
Classification	Oxide ceramic, alumina based
Chemistry	Al_2O_3 13TiO_2
Manufacture	Various (see Section 2.2)
Morphology	Various (see Section 2.2)
Purpose	Wear, chemical resistance, electrical and thermal insulation
Service Temperature	≤ 540 °C (1000 °F)
Melting Point	approx. 2000 °C (3632 °F)
Process	Atmospheric plasma spray or combustion powder Thermospray™



SEM photomicrographs. Top: Metco 130SF (mechanically clad). Bottom: Metco 6221 (agglomerated and sintered).

2 Material Information

2.1 Chemical Composition

Product	Chemical Composition (nominal wt. %)						
	Al_2O_3	TiO_2	SiO_2 (max)	Fe_2O_3 (max)	MgO (max)	CaO (max)	Total All Others (max)
Amdry 6220	Balance	12.0 – 14.0	0.5	0.2	0.2	0.1	–
Amdry 6224	Balance	12.0 – 14.0	0.5	0.2	0.2	0.1	–
Amdry 6228	Balance	12.0 – 14.0	0.5	0.2	0.2	0.1	–
Metco 130	Balance	11.5 – 15.0	–	–	–	–	5.5
Metco 130SF	Balance	9.5 – 13.5	–	–	–	–	5.5
Metco 6221	Balance	12.0 – 14.0	0.1	0.1	0.2	0.1	1.5

2.2 Particle Size Distribution and Other Characteristics

Product	Nominal Particle Size Distribution (µm)	Color	Morphology	Manufacturing Method
Amdry 6220	–35+5	Light Brown / Grey	Angular / Blocky	Fused, Crushed and Blended
Amdry 6224	–40+5	Light Brown / Grey	Angular / Blocky	Fused, Crushed and Blended
Amdry 6228	–45+15	Light Brown / Grey	Angular / Blocky	Fused, Crushed and Blended
Metco 130	–53+15	Grey	Irregular	Mechanically Clad
Metco 130SF	–45+5	Grey	Irregular	Mechanically Clad
Metco 6221	–45+15	White	Spheroidal	Agglomerated and Sintered

Particle size equal to or above 45 µm determined by sieve analysis; below 45 µm by laser diffraction (Microtrac)

2.3 Key Selection Criteria

- Metco 6221 is an agglomerated and sintered product with a spheroidal morphology that feeds well during spraying. Coatings sprayed with Metco 6221 exhibit very homogeneous phase distributions and smooth surface finishes. Also, the unique microstructure of the powder significantly improves deposit efficiencies even at high feed rates, reducing processing time and overall waste. Coatings of Metco 6221 have comparable to superior performance compared to coatings of Metco 130 and for new applications, Metco 6221 should be chosen as the preferred material.
- Metco 130 and Metco 130SF are similar materials, differing only in particle size distribution. Metco 130SF, being a finer powder, produces coatings that are harder and denser with smoother as-sprayed surface finishes than Metco 130. Metco 130 and Metco 130SF are recommended for resistance to wear by abrasive grains, hard surfaces, fiber, threads, fretting, cavitation and particle erosion. They are appropriate for applications such as printing ink transfer rolls, textile components, petrochemical applications (pump sleeves), mechanical seals and as electrical insulators.
- Amdry 6220 is a fused and crushed powder with a fine particle size distribution. It produces denser coatings with a smooth as-sprayed surface finish, coatings show good abrasive wear resistance with fair resistance to chemical attack. Amdry 6220 is recommended for hydraulic parts, plungers, shaft sleeves, mechanical seals or textile machine parts.
- Amdry 6224 and Amdry 6228 are also fused and crushed powders. These products are recommended for abrasive wear, sliding wear and oxidation resistance. Coating applications include parts used for thread production in textile and synthetic fiber manufacturing. The coatings are also resistant to acidic and alkaline environments.
- In general, Metco 130 and Metco 130SF will produce more homogeneous coatings than Amdry 6220, Amdry 6224 and Amdry 6228. However, coatings of Amdry 6220, Amdry 6224 and Amdry 6228 may have marginally higher fracture toughness than coatings of Metco 130 and Metco 130SF, depending on the spray parameters and processing conditions used.

2.4 Related Products

- Oerlikon Metco offers a number of related compositions that can be used in a range of applications:
- If superior hardness, wear and chemical resistance is required, then pure alumina-based powders such as Metco 105SFP, Metco 6100, Amdry 6060 or Amdry 6062 should be used. High purity alumina powders (Metco 105SFP and Metco 6100) are also the most suitable candidates for electrical and biomedical applications. However, coatings of these compositions do not have as high a fracture toughness as alumina 13 % titania.
- Alumina 3 % titania products such as Metco 101 series, Amdry 187or Amdry 620X series produce coatings having a higher high fracture toughness compared to pure alumina, but are still inferior to coatings of alumina 13 % titania.
- Coatings of alumina 40 % titania compositions possess the highest fracture toughness among the alumina-based oxide ceramics, but they have lower hardness, wear and chemical resistance compared to coatings of alumina 13 % titania products.
- If coatings with higher hardness, wear and corrosion resistance is required, then chromium oxide based products, such as Amdry 64XX series, Metco 6156, Metco 106 series or Metco 136 series should be used. These materials do not have the fracture toughness of alumina 13 % titania coatings.
- For applications requiring superior wear resistance, consider an HVOF-applied carbide material. A cost vs. performance value analysis should be performed as carbide coatings are generally more expensive than the ceramic coatings discussed here. Oerlikon Metco produces a wide range of carbide chemistries tailored for specific applications and HVOF spray guns. Please contact your Oerlikon Metco Sales Representative for more information.

3 Coating Information

3.1 Key Thermal Spray Coating Information

Specification	Typical Data
Recommended Spray Process	Atmospheric Plasma Spray or Combustion Powder Thermospray™
Maximum Service Temperature	540 °C 1000 °F
Finishing Method	■ In most cases, the as-sprayed surface is smooth and coatings can be brushed or wet ground (150 grit diamond wheel) using standard speeds and feeds for grinding ceramics. ■ In other cases, rough grind with a 120 grit silicon carbide or 150 grit diamond wheel and finish grind with a 400 grit diamond wheel. ■ Lap with diamond media if the smoothest possible surface is required.

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	
Atmospheric Plasma	**Combustion Powder**
Metco 9MBM	Metco 6P-II series
Metco F4MB-XL series	
TriplexPro series	
SimplexPro series	

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Amdry 6220	1002824	10 kg (approx. 22 lb)	Stock	Global
Amdry 6224	1002825	10 kg (approx. 22 lb)	Stock	Global
Amdry 6228	1002826	10 kg (approx. 22 lb)	Stock	Global
Metco 130	1000125	5 lb (approx. 2.25 kg)	Stock	Global
Metco 130SF	1000368	5 lb (approx. 2.25 kg)	Stock	Global
Metco 6221	1075119	2.5 kg (approx. 5.5 lb)	Stock	Global

4.2 Handling Recommendations

- Store in the original container in a dry location.
- Tumble contents gently prior to use to prevent segregation.
- Open containers should be stored in a drying oven to prevent moisture pickup.

4.3 Safety Recommendations

See the SDS (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 (Resources – Safety Data Sheets).

Product	SDS No.
Amdry 6220	50-142
Amdry 6224	50-142
Amdry 6228	50-142
Metco 130	50-142
Metco 130SF	50-142
Metco 6221	50-1424

www.oerlikon.com/metco
info.metco@oerlikon.com