

# Material Product Data Sheet

## Pure Aluminum Thermal Spray Wires

### Thermal Spray Wire Products: Metco Aluminum

#### 1 Introduction

Metco™ Aluminum wires are drawn to a variety of diameters for use in electric arc wire and combustion wire Thermospray™ spray systems. The coatings produced by these aluminum wires have a number of characteristics that include resistance to atmospheric, chemical and heat corrosion. In addition, aluminum is a good electrical conductor.

As aluminum is anodic to steel, coatings of aluminum act as excellent sacrificial coatings on steel substrates. Furthermore, the aluminum coating tends to form an oxide film that protects it from further attack.

Aluminum wire coatings are recommended for cathodic corrosion protection in atmospheric and salt / fresh water immersion, with application areas such as oil refining equipment, chemical processing equipment, boat bottom interiors exposed to bilge water and other similar types of exposure. Thermal sprayed aluminum coatings can be applied relatively thick and replace plating or paints, or used as an undercoat to organic coatings and paints. Properly applied, these coatings can last from 15 to 50 years without maintenance.

Aluminum is an excellent conductor of electricity and may be used on aircraft fiberglass panels to disperse static electricity, and many other applications where electrical conductivity is desired.

#### 1.1 Typical Uses and Applications:

- General industry: Cathodic corrosion protection on steel structures such as bridges and water towers, for which the coating can be used alone or as a very good bond and protective undercoat for organic materials
- Aviation: Coatings on fiberglass panels for static dispersion and corrosion protection of outer casings
- Automotive: high temperature corrosion protection on exhaust valves
- Electronics: Electrical conductance on components such as conductive areas on insulators, capacitor end caps and varistors.

#### Quick Facts

Classification	Wire, pure aluminum
Chemical formula	1050 Grade: 99.5%+ Al 1100 Grade: 99.0%+ Al 1350 Grade: 99.5%+ Al
Manufacture	Drawn wire
Melting point	660 °C (1220 °F)
Purpose	Corrosion protection and electrical conductivity
Process	Electric Arc Wire Spray or Combustion Wire Thermospray™



## 2 Material Information

### 2.1 Chemical Composition

	Nominal Chemistry	Weight Percent (nominal)	
		Al (min.)	Cu (max.)
Metco Aluminum (1050 grade)	Al 99.5+	99.5	0.05 – 0.2
Metco Aluminum (1100 grade)	Al 99.0+	99.0	0.05 – 0.2
Metco Aluminum (1350 grade)	Al 99.5+	99.5	–

### 2.2 Available Wire Sizes

Available Wire Diameters	Recommended Spray Process	
	Electric Arc Wire	Combustion Wire
1.45 mm (15 ga)	●	
1.62 mm (14 ga)	●	
2 mm (5/64 in)	●	
2.0 mm (0.079 in)	●	
2.3 mm (11 ga)	●	●
2.5 mm (0.098 in)	●	
3.2 mm (1/8 in)		●
4.0 mm (0.157 in)		●
4.8 mm (3/16 in)		●

Other products sized and packaged for electric arc wire or combustion wire may be available as a special order.

### 2.3 Key Selection Criteria

Choose the product that is:

- Appropriate for the thermal spray process to be used (electric arc wire spray or combustion wire spray)
- Available in your geographical region
- Packaged for the specific equipment to be used, particularly in the case of electric arc wire systems
- The appropriate wire diameter for the spray gun hardware that is installed

### 2.4 Related Products

- Metco AlMg wire provides excellent protection, and is preferred over Metco Aluminum in marine environments.
- Metco ZnAl wire is recommended for applications where cathodic protection is the primary concern.

- Metco Zinc is advantageous for cathodic protection applications in cold water, mild atmospheres where there are no corrosive fumes, when thin coatings are required or when coating areas are difficult to access. Coatings of Metco Zinc have a better 'distance effect' as an anode than coatings of Metco Aluminum. However, zinc cannot be used in acidic environments.
- Metco 54NS and Metco 54NS-1 are pure aluminum powders for the atmospheric plasma spray and combustion powder spray processes.
- Coatings of pure copper wire, such as Metco Copper, or powder, such as Metco 55 provide better electrical conductivity than Metco Aluminum.

## 2.5 Customer Specifications

Specification	Certification When Origin Is:	
	U.S.A.	Germany
American Welding Society (AWS) C2.25/C2.25M W-AL-1100 <sup>a</sup>	●	
ASTM International B-211	●	
Cincinnati Thermal Spray CTS 1333	●	
GE B21B22A		
Honeywell FP 5045, Type VI	●	
Rolls-Royce plc MSRR 9507/105 <sup>b</sup>	●	●

<sup>a</sup> Applies only to 1100 grade aluminum wire.

<sup>b</sup> Applies only to 1050 grade and 1100 grade wire.

## 3 Coating Information

### 3.1 Key Thermal Spray Coating Information

Specification		Typical Values
Macrohardness	HRH	78 – 82
Bond Strength <sup>a</sup>	MPa	7 – 30
	psi	1000 – 4350
Coating Density	g/cm <sup>3</sup>	2.41
Coating Porosity	vol. %	1 – 2
Maximum Service Temperature	°C	538
	°F	1000

<sup>a</sup> On grit-blasted steel. Bond strength dependent on the spray process used. Values shown were determined using FM100 film. If epoxy glues are used, bond strength values will be higher than those listed above as a result of glue penetration.

### 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

Electric Arc Wire	Combustion Wire
SmartArc PPG	Metco 16E Series
Metco LD/Schub 5	Metco 6K
Metco LD/U2	
Metco LD/U3	
Praxair / Tafa wire arc guns	

## 4 Commercial Information

### 4.1 Ordering Information and Availability

Wire Diameter	Order No.	Package Size	Package Type	Availability <sup>1</sup>	Distribution	Origin
<b>1050 Grade</b>						
1.62 mm (14 ga)	1002469	7 kg (15 lb)	Wire Basket Reel	Stock	Europe	Germany
1.62 mm (14 ga)	1066060	60 kg (132 lb)	Drum	Stock	Europe	Germany
2 mm (5/64 in)	1002451	7 kg (15 lb)	Wire Basket Reel	Stock	Europe	Germany
2.0 mm (0.079 in)	1057623	7 kg (15 lb)	Hasp Spool	Special Order	Europe	Germany
2.0 mm (0.079 in)	1002452	100 kg (220 lb)	E560 Spool	Special Order	Europe	Germany
2.3 mm (11 ga)	1066057	60 kg (132 lb)	Drum	Stock	Europe	Germany
2.5 mm (0.098 in)	1057625	7 kg (15 lb)	Hasp Spool	Stock	Europe	Germany
2.5 mm (0.098 in)	1057627	17 kg (37 lb)	Hasp Spool (460)	Stock	Europe	Germany
2.5 mm (0.098 in)	1066496	60 kg (132 lb)	Drum	Stock	Europe	Germany
3.2 mm (1/8 in)	1002494	25 kg (55 lb)	Coil	Stock	Europe	Germany
4.0 mm (0.157 in)	1069402	25 kg (55 lb)	Coil	Special Order	Europe	Germany
4.8 mm (3/16 in)	1002496	25 kg (55 lb)	Coil	Stock	Europe	Germany
<b>1100 Grade</b>						
1.45 mm (15 ga)	1030506	50 lb (22.7 kg)	Coil	Stock	Americas	U.S.A.
1.45 mm (15 ga)	1029051	225 lb (102 kg)	Spool	Stock	Americas	U.S.A.
1.62 mm (14 ga)	1031591	16 lb (7.25 kg)	Dorn Spool	Stock	Global	U.S.A.
1.62 mm (14 ga)	1036247	225 lb (102 kg)	Spool	Special Order	Global	U.S.A.
2.3 mm (11 ga)	1030507	50 lb (22.7 kg)	Coil	Stock	Global	U.S.A.
2.5 mm (0.098 in)	1068756	7 kg (15 lb)	Hasp Spool	Stock	Europe	Germany
2.5 mm (0.098 in)	1073355	17 kg (37 lb)	Hasp Spool	Stock	Global	Germany
3.2 mm (1/8 in)	1030501	50 lb (22.7 kg)	Coil	Stock	Global	U.S.A.
3.2 mm (1/8 in)	1069673	25 kg (55 lb)	Coil	Stock	Europe	Germany
4.0 mm (0.157 in)	1070562	25 kg (55 lb)	Coil	Stock	Europe	Germany
4.8 mm (3/16 in)	1030505	50 lb (22.7 kg)	Coil	Stock	Global	U.S.A.
<b>1350 Grade</b>						
1.62 mm (14 ga)	1040882	16 lb (7.25 kg)	Dorn Spool	Special Order	Global	U.S.A.

<sup>1</sup> Minimum order quantities for special order products may apply.

### 4.2 Handling Recommendations

- Store in the original container in a dry location.
- Do not stack drums; keep drums upright and avoid excessive vibration during transport to prevent decoiling.

### 4.3 Safety Recommendations

See SDS 50-307 (Materials Safety Data Sheet) in the localized version applicable for 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).

Information is subject to change without prior notice.