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PELCO Conductive Silver Paint

AG16062-15

PELCO® Conductive Silver Paint is a highly conductive acrylic paint designed to take conductive paths or reduce electromagnetic or radio frequency interference (EMI/RFI). Long-term protection from EMI/RFI is assured by its durable acrylic resin that minimizes loss of metallization through rubbing, and by the oxidation resistant silver that slows down conductivity degradation with age. The flake shape helps ensure maximum points of contact to ensure better conductivity. In addition, loss of shielding through paint peeling is unlikely since the acrylic resin system was shown, in UL related testing, to adhere to even difficult substrates like AMS and polycarbonates.

Applications and usages:

PELCO® Conductive Silver Paint's primary application is to provide an excellent conductivity EMI/RFI shielding suitable for harsh environments. It may also act as a conductive base for applications where it is necessary to impart the highest degree of conductivity to a surface. As well, the silver is non-magnetic, offering a low relative permeability that provides reasonable skin depths, which makes it suitable for microwave transmissions applications.

Benefits and features:

- Meets MIL-STD-883H (Volume Resistivity = 0.0002 Ω·cm)
- High Surface Conductivity (≥15 Siemen)
- Low Surface Resistance of ≤0.066 Ω/sq @ 1 mil
- Repairable and removable thermoplastic paint system
- Tough and durable coat with excellent weatherability
- Corrosion resistant coating: salt-spray tested
- Stronger adhesion than water-based coatings
- Rub-off resistant
- Median attenuation 75 dB ± 20 dB per 25.4 µm (~1.0 mil) for frequency range of 10 MHz to 18 GHz
- Meets RoHS directive, low-VOC

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Curing and Work Schedule

Properties	Value
Dry to touch (liquid) [(a)]	3 to 5 min
Recoat time (liquid) [(a)]	2 min
Full cure at room temp.	24 hours
Shelf life	1 year
Storage temperature limits [(a)]	-5 to +40°C

Service Ranges

Properties	Value
Service temperature	-40 to +120°C
Maximum coverage per 900ml (c)	<168 000 cm^2
Maximum coverage per US gallon	<709 000 cm^2

a) Assumes let 1.00:0.75 let down with thinner.
b) The product must stay within the storage limits stated.
c) Idealized estimate based on a coat thickness of 25 µm [1.0 mil] and 65% transfer efficiency

Principal Components

Name	CAS Number
Silver	7440-22-4
Acrylic Resin	9003-01-4
Acetone	67-64-1
Ethanol	64-17-5
Toluene	108-88-3

Properties of Cured Product - PELCO Conducive Silver Paint

Electric & Magnetic Properties	Method	Value	
Volume Resistivity [(a)]	Method 5011.5 in MIL-STD-883H	0.0002 Ω·cm	
Surface Resistance:		Resistance [(b)]	Conductance [(b)]
1 x coat @ 1 mil	Square	0.066 Ω/sq	15 S
2 x coat @ 2 mil	Square	0.055 Ω/sq	18 S
3 x coats @ 2.5 mil	Square	0.040 Ω/sq	25 S
Magnetic class		Diamagnetic (non-magnetic)	
Relative permeability		<1.0	
Shielding Attenuation for 33 µm (1.0 mil)	IEE STD 299-1997		
10 to 100 kHz	"	54 dB to 75 dB	
100 kHz to 1 MHz	"	50 dB to 65 dB	
1 MHz to 10 MHz	"	54 dB to 65 dB	
10 MHz to 100MHz	"	41 dB to 54 dB	
100 MHz to 1 GHz	"	35 dB to 67 dB	
1 GHz to 10 GHz	"	41 dB to 59 dB	
10 GHz to 18 GHz	"	36 dB to 72 dB	

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Physical Properties	Method	Value
Resin technology	-	Lacquer (thermoplastic)
Colour	Visual	Metallic silver grey
Abrasion resistant	-	Yes
Blister resistant	-	Yes
Peeling resistant	-	Ues
Environmental and Aging Study	Method	Value
Spray salt test: 7 day @ 35°C +Salt/Fog	ASTM B117-2011	
Cross-hatch adhesion	ASTM D3359-2009	5B = 0% area removed
Cracking, unwashed area	ASTM D661-93	None
Visual colour, unwashed area	ASTM D1729-96	Severe yellowing & discolouration
Peeling, unwashed area	ASTM D1729-96	None

Note: The first coat thickness is typically around 25 µm [1.0 mil].

a) Tested by an external and independent laboratory using four point probe -1
b) Surface resistance is given in Ω/sq and the corresponding conductance in Siemens (S or Ω)

Surface Resistance by Coating Thickness

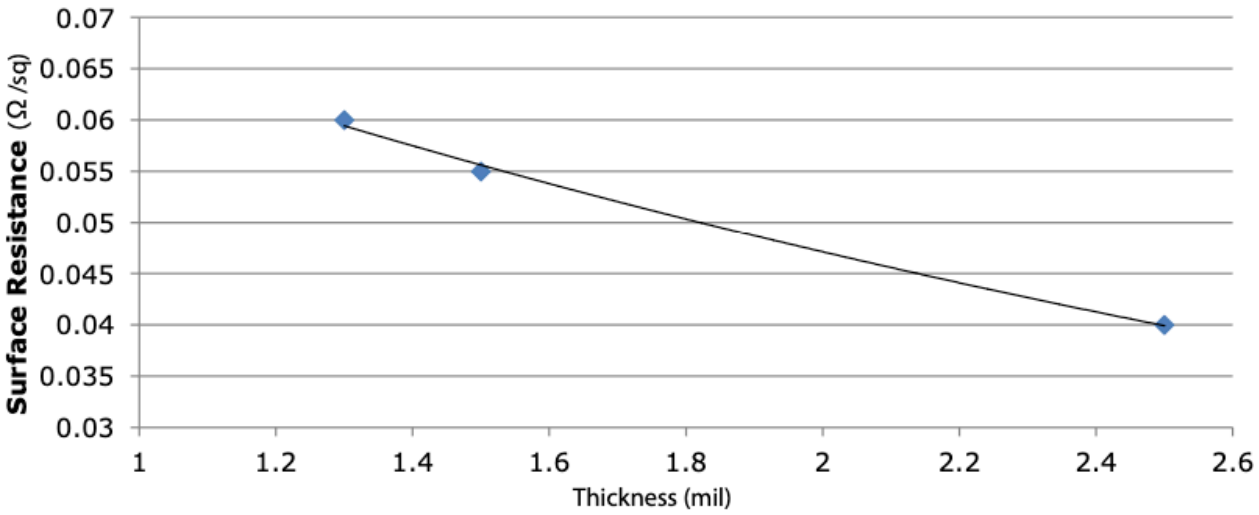

Figure 1: Silver coating surface resistance at different thicknesses.

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Properties of Uncured Product – PELCO Conductive Silver Paint

Physical Property	Mixture
Colour	Metallic silver grey
Density	2.15 g/ml
Solids Percentagre (wt/wt) [(a)]	~73%
Viscosity at 25°C [77 °F] [(b)]	~8,000 cP
Flash Point	-16 °C [3.2 °F]
Odour	Ethereal, benzene-like

[(a)] Percentage for liquid only (before thinning) [(b)] Brookfield viscometer

Compatibility

Chemical – The silver filler is quite resistant to oxidation, except in environments that contain contaminants like H2S or ozone which tarnish its surface. Unlike many other metal oxides, silver oxide remains conductive so degradation do to oxidation is not as bad.

The thermoplastic resin is dissolved by common paint solvents like toluene, xlyene, acetone and MEK. This allows great coating repair and work characteristics, but it does make the coating unsuitable for solvent rich environments.

Adhesion

PELCO® Conductive Silver Paint coating adheres to ABS, PBT, PC, PU, PVA, acrylics, metals, expoxies and wood; however, it is not compatible contaminants like water, oil, and greasy flux residues that may affect adhesion. If contamination is present, clean the surface to be coated first.

Storage

Store between -5°C and 40˚C (23˚C and 104˚F) in dry area.