Technical Data Sheet

Silver Conductive Coating

#12684-15

Introduction

EMS Silver Conductive Coating is a highly conductive acrylic paint designed to take conductive paths or reduce electromagnetic or radio frequency interference (EMI/RFI). Because it is a durable acrylic resin, long-term protection from EMI/RFI is assured. It 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. Loss of shielding through paint peeling is unlikely since the acrylic resin system has been UL-tested and shown to adhere to even difficult substrates like AMS and polycarbonates.

The 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. Being non-magnetic, it also offers a low relative permeability that provides reasonable skin depths, which makes it ideal for microwave transmissions applications.

Feature Highlights and Benefits

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

Cure Rates and Shelf Life

**Dry to Touch (Liquid)*:	*3 to 5 min*
*Recoat time (Liquid):	2 min
Full Cure at room temp.:	24 hour

Full Cure at 65°C:	1 year
**Storage Temperature Limits:	-5 to +40°C (+23 to +104°F)

*Assumes let 1.00:0.75 let down with thinner.

**The product must stay within storage temperature limits stated.

Service Ranges

Service Temperature:	-40 to +120°C (-40 to +248°F)
***Maximum coverage per 900 mL::	<168 000 cm² (<180ft²)
***Maximum coverage per US gal:	<709 000 cm² (<763 ft²)

***Idealized estimate based on a coat thickness of 25 µm (1.0mil) and 65% transfer efficiency.

Principal Components and their 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 EMS Conductive Silver Coating

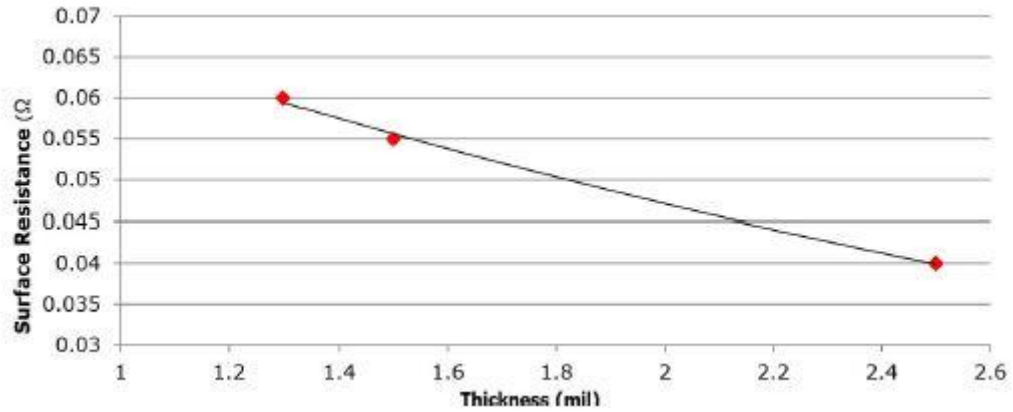
NOTE: The first coat thickness is typically around 25 µm [1.0 mil].

Electric & Magnetic Properties	**Method**	**Value**	
Volume Resistivity (Tested by an external and independent laboratory using four point probe.)	Method 5011.5 in MIL-STD-883H	0.0002 Ω·cm	
Surface Resistance :1 x coat @ 1 mil	square probe	*Resistance 0.066 Ω/sq	*Conductance 15S

:2 x coats @ 2 mil		"	0.055 Ω/sq 18S
:3 x coats @ 2.5 mil		"	0.040 Ω/sq 25S **NOTE: Surface resisance is given in /sq and the corresponding conductance in Siemens (S or)*
Magnetic class relative permeability			Diamagnetic (Non-magnetic) <1.0
Shielding Attenuation 33 µm [1.0 mil]			
10 to 100 kHz	IEEE STD 299-1997		54 dV 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 100 MHz		"	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
Physical Properties	**Method**		**Value**
Resin technology		–	Lacquer (Thermoplastic)
Color	Visual		Metallic Silver Grey
Abrasion resistant		–	Yes
Blister resistant		–	Yes
Peeling resistant		–	Yes
Environmental & Aging Study	**Method**		**Value**
Salt Spray 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 Color, unwashed area	ASTM D1729-96	Severe yellowing & discoloration
Peeling, unwashed area	ASTM D1729-96	None

Graph–Silver Coating Surface Resistance at Different Thicknesses



Properties of Uncured EMS Conductive Silver Coating

Physical Property	Mixture
Color	Metallic Silver Grey
Density @ 25°C	2.15 g/mL
Solids Percentage (wt/wt) (Percentage for liquid only before thinning)	~73%
Viscosity at 25°C (77F) (Brookfield viscometer)	~8,000 cP
Flash Point	-16°C (3.2°F)
Odor	Ethereal, benzene-like

Compatibility

Chemical	The silver filler is very resistant to oxidation, except in environments containing contaminants such as ozone or H2S, which tarnish its surface. Silver oxide remains conductive so degradation due to oxidation is not as bad as it is with many other metal oxides. Common paint solvents like acetone, toluene, MEK, and xylene can dissolve the

	thermoplastic resin. This does make for easier coating repair and work characteristics but is also makes the coating unsuitable for environments that have a lot of solvents.
Adhesion	EMS Conductive Silver Paint coating adheres to acrylics, metals, epoxies, wood, ABS, PBT, PC, PU, and PVA. *NOTE: It is not compatible with contaminants like water, oil, and greasy flux residues which may affect adhesion. If contamination is present, clean the surface before coating.*

Storage

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