

Product No. 16055 – PELCO® Conductive Nickel Paint

Description

Product No. 16055 – PELCO® Conductive Nickel Paint is a conductive acrylic paint designed to make conductive paths or reduce electromagnetic or radio frequency interference (EMI/RFI)—an issue for all electronic devices. Long-term protection from EMI/RFI is assured by its oxidation resistant flakes and durable acrylic binder.

The acrylic binder minimizes loss of metallization through rubbing, and paint peeling. The Product No. 16055 coating is UL approved for adhesion to ABS and polycarbonates at both hot and cold temperatures.

The high oxidation resistance of the high-purity nickel flakes ensures a long-term conductivity that will not degrade quickly over time, making it suitable for marine and other harsh environments. In cases of degradation, the coating is removable or repairable to re-establish the desired shielding performance.

Applications & Usages

Product No. 16055 – PELCO® Conductive Nickel Paint is well suited for coating the interior of plastic electronic enclosures and offers a simple way to deal with EMI/RFI issues, allowing devices to pass FCC emission testing. Its primary applications are in cell phones, PDA's, other consumer electronics, telecommunication equipment, industrial equipment, medical devices, military devices, and aerospace equipment. Furthermore, it can be used to shield entire rooms that will be over-coated with a decorative acrylic paint. Other applications include providing electric continuity for circuits and protecting conductive metal surfaces prone to oxidation. Additional applications include circuit board repair, conducting adhesive cement or making grounding path for SEM applications.

Benefits and Features

- Tested in compliance with IEEE Std. 299-1997
- High Conductivity—0.0042 Ω-cm; 0.6 Ω/sq for one coat
- Repairable and removable thermoplastic paint system
- Tough and durable coat, salt spray tested with excellent weatherability
- Stronger adhesion than water based coatings
- Median attenuation 50 dB ±25 dB per 38 μm (~1.5 mil) for frequency range of 10 to 18,000 MHz

Curing & 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 h
Full Cure (at 65 °C)	30 min
Shelf Life	3 y
Storage Temperature Limits	-5 to +40 °C [+23 to +104°F]

a) Assumes let 1:1 let down with Thinner

b) The product must stay within the storage temperature limits stated.

Service Ranges

Properties	Value
Service Temperature	-40 to +120 °C [-40 to +248 °F]
Maximum Coverage per Liter ^{c)}	<82 000 cm ² [<88 ft ²]
Maximum Coverage per U.S. Gallon ^{c)}	<311 000 cm ² [<335 ft ²]

c) Idealized estimate based on a coat thickness of 25 μm [1.0 mil] and 65% transfer efficiency.

Principal Components

Name	CAS Number
Nickel Flake (High Purity)	744-02-0
Acrylic Resin	9003-01-4
Talc	1487-96-6
Toluene	108-88-3
Acetone	67-64-1

Properties of Cured Product No. 16055 – PELCO® Conductive Nickel Paint

<i>Electric Properties</i>	<i>Method</i>	<i>Value</i>
Volume Resistivity ^{a)}	Method 5011.5 in MIL-STD-883H	Resistance ^{b)} Conductance ^{b)} 0.0042 Ω·cm 240 S/cm
Surface Resistance : 1 × coat (~1.50 mil)	Square probe	≤0.60 Ω/sq 1.7 S
: 2 × coats (~3.00 mil)	Square probe	≤0.25 Ω/sq 4.0 S
: 3 × coats (~4.50 mil)	Square probe	≤0.15 Ω/sq 6.7 S
Magnetic Class		Ferromagnetic (magnetic)
Relative Permeability		≥100
Shielding Attenuation ^{c)} for 33 μm [1.5 mil]	IEEE STD 299-1997	
10 to 100 kHz	"	42 dB to 75 dB
>100 kHz to 1 MHz	"	42 dB to 69 dB
>1 MHz to 10 MHz	"	40 dB to 69 dB
>10 MHz to 100 MHz	"	24 dB to 40 dB
>100 MHz to 1 GHz	"	29 dB to 48 dB
>1 GHz to 10 GHz	"	31 dB to 57 dB
>10 GHz to 18 GHz	"	31 dB to 58 dB
<i>Physical Properties</i>	<i>Method</i>	<i>Value</i>
Resin Technology	—	Lacquer (Thermoplastic)
Color	Visual	Steel grey
Abrasion Resistant	—	Yes
Blister Resistant	—	Yes
Peeling Resistant	—	Yes
Water and Salt Spray Resistant	—	Yes
<i>Environmental & Ageing Study</i>	<i>Method</i>	<i>Value</i>
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	Trace fading
Peeling, unwashed area	ASTM D1729-96	None

Note: One coat thickness is typically around 38 μm [1.5 mil].

a) Tested by an external and independent laboratory using four point probe

b) Surface resistance is given in Ω/sq and the corresponding conductance in Siemens (S or Ω⁻¹)

c) Shield attenuation (with respect to a reference sample without shield isolation) is given for adjacent frequency ranges and provides the minimal and maximal value registered within these ranges.

Surface Resistance by Coating Thickness

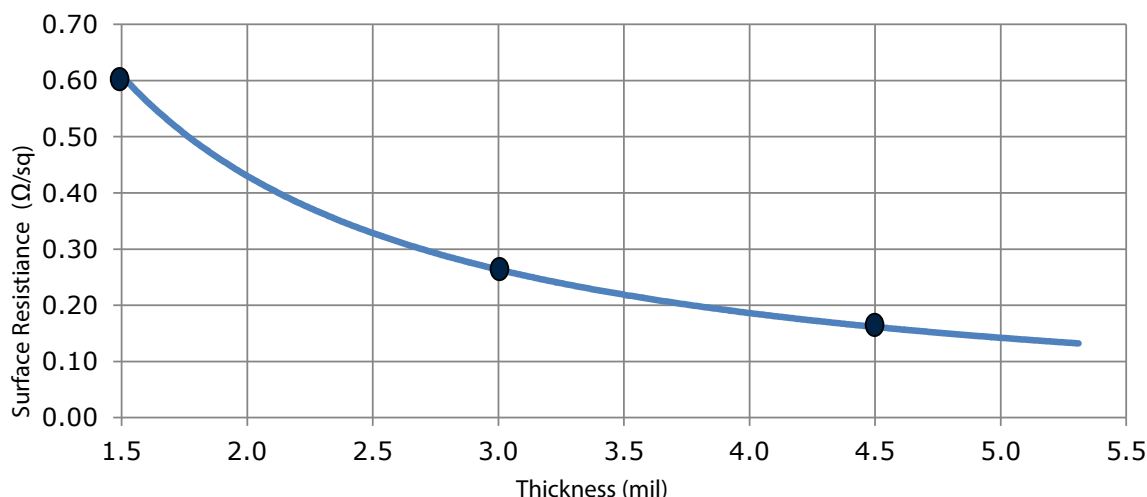


Figure 1. Nickel conductive coating surface resistance at different thicknesses (the dots indicate typical successive coat thicknesses)

Properties of Uncured Product No. 16055 – PELCO® Conductive Nickel Paint

Physical Properties	Mixture
Color	Light Steel Grey
Viscosity at 25 °C [77 °F] ^{a)}	3920 cP [3.92 Pa·s]
Density	1.69 g/mL
Solids Percentage (wt/wt) ^{b)}	47 - 52%
Flash Point ^{b)}	-18 °C [-0.4 °F]
Odor	Ethereal

a) Brookfield viscometer at 30 RPM with spindle LV4

b) Based on flash point acetone

Compatibility

Chemical — Nickel has good resistance to oxidation in a variety of corrosive environments, including marine environments. In normal atmosphere or freshwater, nickel typically corrodes less than 0.0025 mm per year. Since nickel forms a passive protective film on its surface that slows down or stops further corrosion, the passive nickel resists corrosion better than pure copper fillers. In addition, nickel is harder than its silver or copper filled counterparts, helping provide greater durability.

The thermoplastic acrylic resin is incompatible common paint solvents like toluene, xylene, acetone, and z MEK. Further, it will not withstand chronic exposures to engine oils, fuels and other similar hydrocarbons. While this makes the coating unsuitable for solvent rich environments, it does offers great repair and rework characteristics.

Adhesion — The Product No. 16055 – PELCO® Conductive Nickel Paint coating adheres to ABS, PBT, and most materials found on printed circuit assemblies; however, it is not compatible with 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°F and 104 °F] in dry area.