

Description

The 843 *Silver Coated Copper Conductive Coating* is a highly conductive acrylic paint designed to 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. 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 ABS and polycarbonates.

Applications & Usages

Its primary application is to provide a reasonable cost, high-conductivity EMI/RFI shielding. It may also act as a conductive base for low temperature electroplating processes or for any other manufacturing processes where it is necessary to impart conductivity to a surface. As well, the silvered copper powder is non-magnetic, offering a low relative permeability that provides reasonable skin depths, which makes it suitable for microwave transmissions applications.

Benefits and Features

- **High Conductivity—0.0011 Ω·cm; 0.21 Ω/sq for one coat (1.0 mil)**
- **Removable and repairable thermoplastic paint system**
- **Tough and durable coat, salt spray tested with excellent weatherability**
- **Stronger adhesion than water based coatings**
- **More corrosion resistant than copper alone**
- **Median attenuation 60 dB ±18 dB per 25.4 μm (~1.0 mil) for frequency range of 10 kHz to 18 GHz**

ENVIRONMENT
Meets RoHS directive
Low-VOC

Curing & Work Schedule

<i>Properties</i>	<i>Value</i>
Dry to Touch (Liquid)	3 to 5 min
Recoat time (Liquid)	2 min
Full Cure @25 °C [77 °F]	24 h
Full Cure @65 °C [149 °F]	60 min
Shelf Life	3 y
Storage Temperature Limits ^{a)}	-5 to +40 °C [+23 to +104°F]

a) The product must stay within the storage temperature limits stated. **ATTENTION!** Aerosol container will be crushed at ≤-26.5 °C [≤15.7 °F].

Service Ranges

<i>Properties</i>	<i>Value</i>
Service Temperature	-40 to +120 °C [-40 to +248 °F]
Maximum coverage per can ^{b)}	<5,100 cm ² [<1,590 in ²]

b) Idealized estimate based on a coat thickness of 25 μm [1.0 mil] and 50% transfer efficiency



ISO 9001 Registered Quality System.
Burlington, Ontario, Canada QMI File # 004008

Super Shield™ Silver Coated Copper Conductive Coating 843 Technical Data Sheet

843-Aerosol

Principal Components

Name	CAS Number
Silvered Copper	7440-22-4 + 7440-50-8
Acrylic Resin	9003-01-4
Acetone	67-64-1
Ethanol	64-17-5
Toluene	108-88-3

Properties of Cured 843

<i>Electric & Magnetic Properties</i>	<i>Method</i>	<i>Value</i>
Volume Resistivity ^{a)}	Method 5011.5 in MIL-STD-883H	0.0011 Ω·cm
Surface Resistance : 1 × coat @ 1 mil : 2 × coats @ 2 mil : 3 × coats @ 3 mil	square probe square probe square probe	Resistance ^{b)} Conductance ^{b)} 0.21 Ω/sq 5.3 S 0.09 Ω/sq 11 S 0.04 Ω/sq 25 S
Magnetic class		Diamagnetic (Non-magnetic)
Relative permeability		<1.0
Shielding Attenuation for 33 μm [1.0 mil]	IEEE STD 299-1997	
10 to 100 kHz	"	58 dB to 78 dB
>100 kHz to 1 MHz	"	54 dB to 65 dB
>1 MHz to 10 MHz	"	53 dB to 56 dB
>10 MHz to 100 MHz	"	47 dB to 56 dB
>100 MHz to 1 GHz	"	42 dB to 65 dB
>1 GHz to 10 GHz	"	42 dB to 56 dB
>10 GHz to 18 GHz	"	48 dB to 62 dB
<i>Physical Properties</i>	<i>Method</i>	<i>Value</i>
Resin technology	—	Thermoplastic
Color	Visual	Light brown
Abrasion resistant	—	Yes
Blister resistant	—	Yes
Peeling resistant	—	Yes
Water 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	Severe discoloration
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

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

Surface Resistance by Coating Thickness

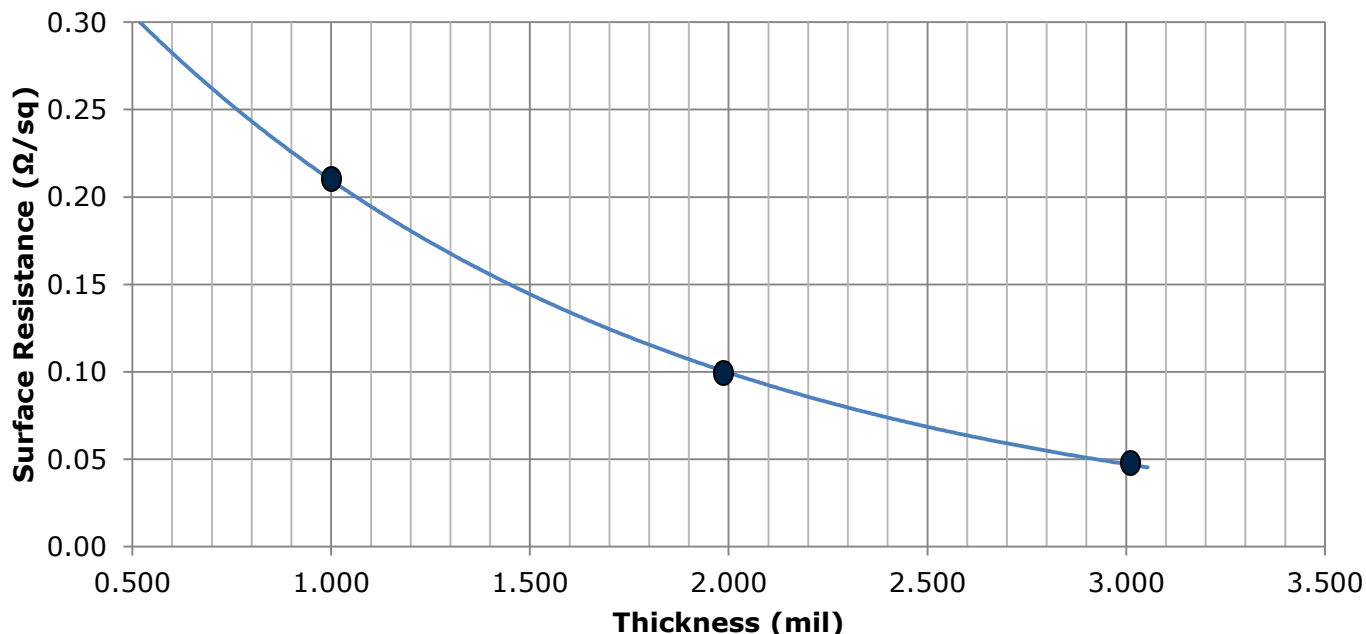


Figure 1. Silvered copper coating surface resistance at different thicknesses (the dots indicate typical successive coat thicknesses)

Properties of Uncured 843

<i>Physical Property</i>	<i>Mixture</i>
Color	Brown
Density @25 °C	1.4 g/mL
Solids Percentage (wt/wt) ^{a)}	~41%
Viscosity @25 °C [77 °F] ^{b)}	<3,450 cP
Flash Point	-16 °C [3.2 °F]
Odor	Ethereal

a) Percentage for liquid only (before thinning)

b) Brookfield viscometer at 100 RPM with spindle LV4



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Compatibility

Chemical—The silver coated copper is quite resistant to oxidation, except in environments that contain contaminants like H₂S or ozone which tarnish its surface.

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

Adhesion—The 843 coating adheres to most plastics used to house 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.

843 Adherence Compatibility

<i>Substrate</i>	<i>Note</i>
Acrylonitrile Butadiene Styrene (ABS)	Chemically etches ^a and adheres well to this substrate.
Polybutylene Terephthalate (PBT)	"
Polycarbonate	"
Polyvinyl Acetate (PVA)	"
Acrylics or acrylic paints	Adheres well to clean surface
Copper, lead, tin	"
Epoxy, FR4 substrate	"
Polyurethane	Adheres well to clean surface for most urethane types
Wood	Adheres well with surface preparation

a) Etching is similar to sanding, except that it also softens the surface helping to meld the paint to the plastic for superior adhesion.

ATTENTION! Use with care on thin plastics or on plastics where you want to keep original surface intact. The 843 spray contains a controlled amount of solvents designed to chemically etch plastic surfaces to help adhesion by melding the acrylic coating into the plastic substrate. This prevents flaking or peeling.

Storage

Store between -5 °C and 40 °C [23°F and 104 °F] in dry area.

Health, Safety, and Environmental Awareness

Please see the 843 **Material Safety Data Sheet** (MSDS) for greater details on transportation, storage, handling and other security guidelines.

Environmental Impact: The regulated volatile organic content is 9.5% (134 g/L) by EPA and WHMIS standards.

This product meets the European Directive 2011/65/EU Annex II (ROHS); recasting 2002/95/EC.

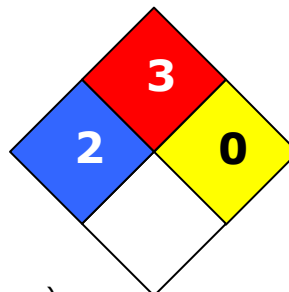
Health and Safety: The solvents in 843 can ignite if exposed to flames or sparks and can cause respiratory track irritation. If ignited, then flame flash back is possible. Use in well-ventilated area.

Solvents can cause skin irritation and have some reproductive effects. Wear safety glasses or goggles and disposable gloves to avoid exposures.

HMIS® RATING

HEALTH:	2
FLAMMABILITY:	3
PHYSICAL HAZARD:	0
PERSONAL PROTECTION:	

NFPA® 704 CODES



Approximate HMIS and NFPA Risk Ratings Legend:

0 (Low or none); 1 (Slight); 2 (Moderate); 3 (Serious); 4 (Severe)

Aerosol Application Instructions

For best results, apply thin wet coats as opposed to using thick coats. We recommend a final dry film thickness of at least 1.0 mil [25 µm]. Follow the procedure below for ensure optimal conductivity.

Prerequisites

Clean and dry the surface of the substrate to remove

- Oil, dust, water, solvents, and other contaminants

Material & Equipment

- Personal protection equipment (See 843-Aerosol MSDS)

To apply the required thickness by weight

1. Shake the can vigorously for 2 minutes, and swirl the bead around the bottom to lift settled material back in solution.
2. Spray a test pattern. This step ensures good flow quality and helps establish appropriate distance to avoid runs.
3. At a distance of 20 to 25 cm (8 to 10 inches), spray a thin and even coat onto a vertical surface. For best results, use spray-and-release strokes with an even motion to avoid excess paint in one spot. Start and end each stroke off the surface.
4. Before the next coat, rotate the surface 90° or change stroke direction (horizontal or vertical) to ensure good coverage.
5. Wait 1 minute, shake can, and spray another coat. The delay avoids trapping solvent between coats.
6. Apply additional coats until desired thickness is achieved. (Go to Step 3)
7. Let dry for 7 minutes (flash off time) at room temperature.

NOTE: Swirling the aerosol can slightly while waiting prevents settling.

ATTENTION!

- Holding the can with at a non-vertical angle during the spray application may result in uneven application.
- Coats that are applied too thick cause runs and hamper solvent evaporation.
- Spraying onto horizontal surfaces is not recommended.

After use, clear the nozzle of the aerosol

1. Invert the aerosol can upside down.
2. Press button until clear propellant comes out. The propellant should become clear in a few seconds.

ATTENTION! Failure to clear nozzle can lead to valve being blocked open or closed in a non-noticeable way.

- If blocked closed, the can will not be usable.
- If blocked slightly open, the contents can spill out overnight creating a mess.

To cure at Room temperature

- Let air dry 24 hours

To accelerate cure by heat

- After flash off, put in oven or under heat lamp at ≤ 65 °C for 30 min.

NOTE: Coats that are very thick require more time to dry. Heat curing ensures optimal performance.

ATTENTION! If heat curing, do not exceed 65 °C as this may cause surface defects due to solvents evaporating off too quickly.



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Packaging and Supporting Products

<i>Cat. No.</i>	<i>Form</i>	<i>Net Volume</i>	<i>Net Weight</i>	<i>Shipping Weight</i>
843-140G	Aerosol	60 mL 2 fl oz	0.14 kg 3.2 oz	2 kg ^{a)} 4.4 lb ^{a)}
843-340G	Aerosol	150 mL 5 fl oz	0.34 kg 12 oz	4 kg ^{a)} 8.8 lb ^{a)}
843-900ML	Liquid	0.9 L 0.24 gal	1.54 kg 3.4 lb	1.8 kg 4 lb
843-1G	Liquid	3.8 L 1.0 gal	6.4 kg 14.2 lb	7 kg 15 lb

a) Pack of 10 cans

Technical Support

Contact us regarding any questions, improvement suggestions, or problems with this product. Application notes, instructions, and FAQs are located at www.mgchemicals.com.

Email: support@mgchemicals.com

Phone: 1-800-340-0772 Ext. 30 (Canada, Mexico & USA)

1-905-331-1396 Ext. 30 (International)

Fax: 1-905-331-2862 or 1-800-340-0773

Mailing address: **Manufacturing & Support**
1210 Corporate Drive
Burlington, Ontario, Canada
L7L 5R6

Head Office
9347-193rd Street
Surrey, British Columbia, Canada
V4N 4E7

Warranty

M.G. Chemicals Ltd. warranties this product for 12 months from the date of purchase by the end user. *M.G. Chemicals Ltd.* makes no claims as to shelf life of this product for the warranty. The liability of *M.G. Chemicals Ltd.* whether based on its warranty, contracts, or otherwise shall in no case include incidental or consequential damage.

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