

## Description

The 842AR *Super Shield™ Silver Conductive Coating* is a one-part durable acrylic lacquer pigmented with an extremely conductive silver flake, packaged in convenient aerosol format. It utilizes a solvent based system with no heat cure necessary. The cured coating is smooth, hard, and abrasion resistant. It provides good adhesion to plastics, extreme conductivity, very high frequency shielding, and extreme corrosion resistance, even in harsh marine environments.

## Applications & Usages

The 842AR is designed to provide a conductive coating to the interior of plastic electronic enclosures to suppress EMI/RFI emissions. It excels when the highest level of shielding is required.

It is optimal for military, medical, or other mission critical applications where the highest levels of attenuation are essential.

The 842AR is commonly used by manufacturers of these devices:

- Medical Equipment
- Military equipment
- Scientific equipment
- Test Equipment
- Communication devices
- Cellphones, laptops, PDA's
- Consumer electronics
- Automotive applications
- Aerospace applications
- Drones and other RC vehicles

Other applications for 842AR include:

- Repairing damage to existing shielding
- Conductive undercoat for electroplating
- Providing electric continuity for circuits
- Circuit repair

It is a simple effective solution to impart maximum conductivity to a surface.

## Benefits and Features

- **Provides extreme EMI/RFI shielding over a broad frequency range**
- **Volume resistivity of 0.000076  $\Omega$ ·cm**
- **Smooth, durable, and abrasion resistant**
- **Available in liquid format**
- **Quick dry time, no heat cure required**
- **Mild solvent system**
- **Strong adhesion to acrylic, ABS, polycarbonate, and other injection molded plastics**
- **Excellent adhesion to wood and ceramics**
- **Extremely corrosion resistant, suitable for harsh marine environments**
- **Low VOC; HAP Free; Does not contain toluene, xylene, or MEK**

### ENVIRONMENT

RoHS Compliant  
Low-VOC



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

# Super Shield™ Silver Conductive Coating 842AR Technical Data Sheet

842AR-Aerosol

## Usage Parameters

Properties	Value
Recoat Time (liquid)	3 min
Drying Time @25 °C [77 °F]	24 h
Drying Time @65 °C [149 °F]	30 min
Shelf Life	2 y
Theoretical 340G Spray Can Coverage <sup>a)</sup>	≤3 800 cm <sup>2</sup> ≤580 in <sup>2</sup>

a) Idealized estimate based on a coat thickness of 50 µm [2.0 mil] and 50% transfer efficiency

## Temperature Ranges

Properties	Value
Constant Service Temperature	-40 to 120 °C [-40 to 248 °F]
Intermittent Temperature Limits	-50 to 125 °C [-58 to 257 °F]
Storage Temperature Limits <sup>b)</sup>	-5 to 40 °C [23 to 104 °F]

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

## Principal Components

Name	CAS Number
Silver	7440-22-4
Acrylic Resin	25608-33-7
Acetone	67-64-1
Dimethyl carbonate	616-38-6
Heptan-2-one	110-43-0

## Properties of Cured 842AR

Electric & Magnetic Properties	Method	Value
Volume Resistivity	Method 5011.5 in MIL-STD-883H	0.000076 Ω·cm      13 000 S/cm
Surface Resistance <sup>a)</sup>		<i>Resistance</i> <i>Conductance</i>
1 coat @0.7 mil	Square probe	0.03 Ω/sq      30 S
2 coats @1.5 mil	Square probe	<0.01 Ω/sq <sup>b)</sup> >100 S
3 coats @1.6 mil	Square probe	<0.01 Ω/sq <sup>b)</sup> >100 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	"	84 dB to 89 dB
>100 kHz to 1 MHz	"	82 dB to 93 dB
>1 MHz to 10 MHz	"	56 dB to 79 dB
>10 MHz to 100 MHz	"	51 dB to 70 dB
>100 MHz to 1 GHz	"	70 dB to 81 dB
>1 GHz to 10 GHz	"	62 dB to 83 dB
>10 GHz to 18 GHz	"	48 dB to 70 dB



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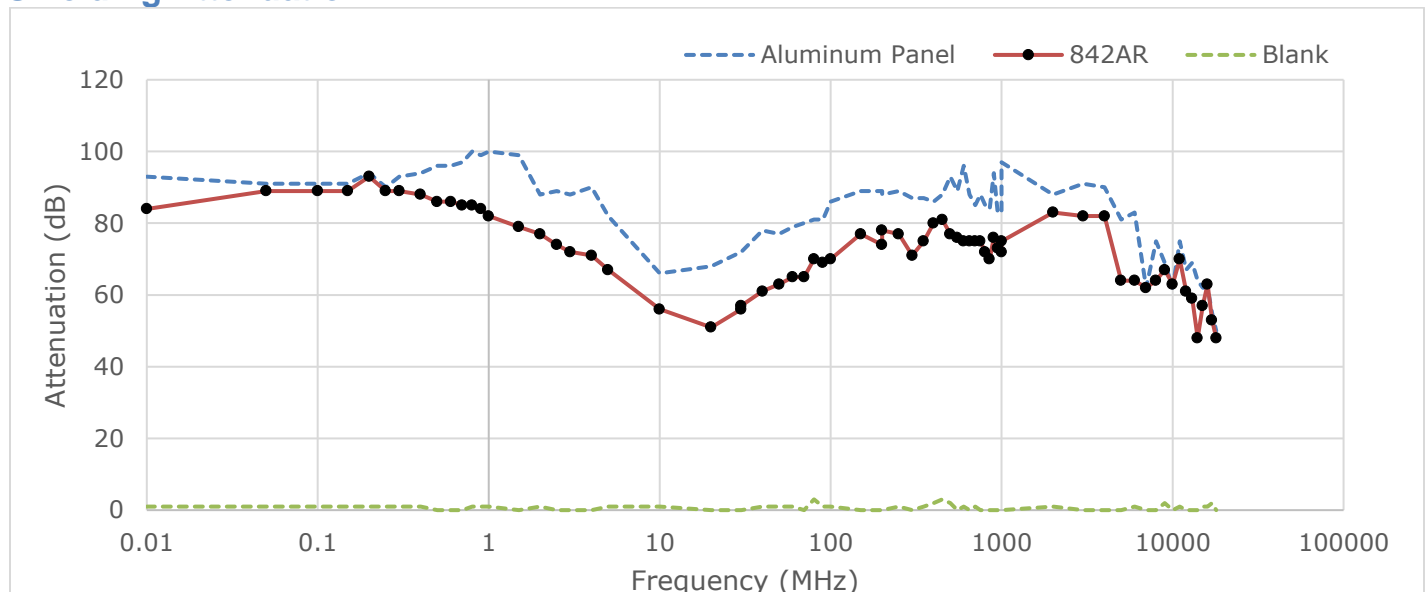
<i>Physical Properties</i>	<i>Method</i>	<i>Value</i>
Paint Type	—	Lacquer (Thermoplastic)
Color	Visual	Metallic Silver
Abrasion Resistant	—	Yes
Blister Resistant	—	Yes
Peeling Resistant	—	Yes
Water Resistant	—	Yes
<i>Mechanical Properties</i>	<i>Method</i>	<i>Value</i>
Adhesion <sup>a)</sup>	ASTM D3359	5B
Pencil Hardness <sup>a)</sup>	ASTM D3363	F, hard
<i>Environmental &amp; Ageing Study</i>	<i>Method</i>	<i>Value</i>
Salt Fog Test @35 °C [95 °F], 96 h	ASTM B117-2011	
Resistivity before	MG-ELEC-120	<0.01 Ω/sq <sup>b)</sup>
Resistivity after	"	0.05 Ω/sq
%Conductivity after	"	<20%
Cross-Hatch Adhesion	ASTM D3359-2009	5B
Cracking, unwashed area	ASTM D661-93	None
Visual Color, unwashed area	ASTM D1729-96	Slight yellowing

a) Tested on acrylonitrile butadiene styrene (ABS) coupons

b) Readings of less than 0.01 Ω/sq are below the detection limit of the handheld multimeter and square probe method.

The coating attenuation value is provided in Figures 1.

## Shielding Attenuation



**Figure 1.** Attenuation of 842AR coating at different frequencies



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## Properties of Uncured 842AR

<i>Physical Property</i>	<i>Mixture</i>
Color	Metallic Silver
Density @25 °C [77 °F]	1.3 g/mL
Solids Percentage (wt/wt)	41%
Viscosity @25 °C [77 °F] <sup>a)</sup>	38 cP [29 mm <sup>2</sup> /s]
Flash Point	-17 °C [1.4 °F]
Odor	Ethereal

a) Brookfield viscometer at 100 RPM with spindle LVS61

## Compatibility

**Chemical**—The silver filler is quite resistant to oxidation, except in environments that contain contaminants like H<sub>2</sub>S or ozone which tarnish its surface. Unlike many other metal oxides, silver oxide remains conductive so degradation due to oxidation is not as bad.

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 842AR 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.

## 842AR Adherence Compatibility

<i>Substrate</i>	<i>Note</i>
Acrylonitrile Butadiene Styrene (ABS)	Chemically etches <sup>a)</sup> and adheres well to this substrate.
Polybutylene Terephthalate (PBT)	"
Polycarbonate	"
Polyvinyl Acetate (PVA)	"
Polyvinyl Chloride (PVC)	"
Acrylics or Acrylic Paints	Adheres well to clean surface
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!** Do not use on thin plastics or on plastics where you want to keep original surface intact. The 842AR 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. Using the 4351-1L thinner lessens the etching effects for chemically sensitive substrates.

## Storage

Store between -5 and 40 °C [23 and 104 °F] in dry area away from sunlight. Temperatures below or above these outer limits will result in the container being crushed and/or ruptured.

## Health, Safety, and Environmental Awareness

Please see the 842AR-Aerosol **Safety Data Sheet** (SDS) for greater details on transportation, storage, handling and other security guidelines.

**Environmental Impact:** The VOC (Volatile Organic Compound) content is 34% (423 g/L) by EPA and WHMIS standards.

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

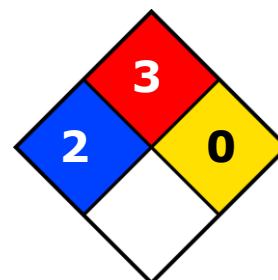
**Health and Safety:** The solvents in 842AR can ignite if exposed to flames or sparks and can cause respiratory track irritation. If ignited, then flame flash back is possible. Use in well-ventilated area.

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

### HMIS® RATING

<b>HEALTH:</b>	* 2
<b>FLAMMABILITY:</b>	3
<b>PHYSICAL HAZARD:</b>	0
<b>PERSONAL PROTECTION:</b>	

### 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

Follow the procedure below for best results. We recommend a coat with a dry film thickness of roughly 1 mil [25 µm]. For thicker coats, apply many thin coats as opposed to spraying a single thick coat.

### Prerequisites

- Ensure surface to be coated is oil free, dust free and clean

### Material & Equipment

- Personal protection equipment (See 842AR-Aerosol SDS)

## To apply the coating

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 3 minutes (flash off time) at room temperature.

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

### **ATTENTION!**

- Holding the can 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. Immediately invert the aerosol can upside down.
2. Press button until clear propellant comes out. The propellant should become clear in a few seconds.
3. Ensure the face of the button is clean of residues by wiping with a cloth or paper towel.

**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>Packaging</i>	<i>Net Volume</i>		<i>Net Weight</i>		<i>Packaging Weight</i>	
<b>842AR-140G</b>	Aerosol	110 mL	3.7 fl oz	140 g	4.9 oz	TBD	TBD
<b>842AR-340G</b>	Aerosol	268 mL	9.0 fl oz	340 g	12 oz	"	"
<b>842AR-15ML</b>	Jar	12 mL	0.4 fl oz	20.8 g	0.73 oz	0.08 kg	0.17 lb
<b>842AR-150ML</b>	Can	150 mL	5.07 fl oz	260 g	9.19 oz	0.31 kg	0.69 lb
<b>842AR-900ML</b>	Can	850 mL	1.79 pt	1.47 kg	3.25 lb	1.82 kg	4.01 lb
<b>842AR-3.78L</b>	Can	3.60 L	3.8 qt	6.26 kg	13.7 lb	6.80 kg	15.0 lb
<b>842AR-P</b>	Pen	5.0 mL	0.16 fl oz	8.69 g	0.3 oz	0.03 kg	0.07 lb

Note: TBD = To Be Determined

### Thinners & Conductive Coating Removers

- *Thinner*: Cat. No. 435-1L, 435-4L
- *Thinner 1*: Cat. No. 4351-1L, 4351-4L

## 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](http://www.mgchemicals.com).

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## Warranty

*M.G. Chemicals Ltd.* warrants 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.

## Disclaimer

This information is believed to be accurate. It is intended for professional end users having the skills to evaluate and use the data properly. *M.G. Chemicals Ltd.* does not guarantee the accuracy of the data and assumes no liability in connection with damages incurred while using it.