842ARTH Technical Data Sheet
Super Shield™ Silver Conductive Coating

842ARTH-Liquid

Description

The 842ARTH *Super Shield™ Silver Conductive Coating* is a highly conductive coating that protects electronic devices in plastic enclosures from high frequency electromagnetic and radio frequency interference (EMI/RFI). The cured coating is a durable acrylic lacquer pigmented with a high-purity silver flake. This one-part, easy-to-use, solvent-based system can be air-cured at room temperature. It offers excellent conductivity, strong adhesion to plastics, great oxidation resistance; and it has a wide variety of applications.

Applications & Usages

The 842ARTH is designed to provide a highly conductive surface within plastic electronic enclosures. It suppresses internal high frequency EMI/RFI emissions and protects the device from external EMI/RFI, allowing compliance to FCC rules and preventing possible malfunction.

Silver offers the strongest EMI/RFI suppression in MG's conductive coating line—especially at higher frequencies. Because it can be applied thinly without losing shielding, it can be used to diminish crosstalk between components in compact devices. It is our best conductive-coating filler for short range EMI applications, such as board level or component to component applications. It is also optimal for military, medical, or other mission critical applications, where the highest levels of attenuation are essential.

The 842ARTH 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 842ARTH include:

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

842ARTH adheres well to wood, copper, aluminum, and many other non-plastics. It is a simple an effective solution to many applications where it is necessary to impart maximum conductivity to a surface.

Benefits and Features

- **Provides extremely effective EMI/RFI shielding over a broad frequency range**
- **Extremely low volume resistivity of 0.0001 Ω·cm**
- **Durable and abrasion resistant**
- **Can be applied at less than 1 mil**
- **Quick dry time, no heat cure required, easy to apply**
- **Mild solvent system, safe on polystyrenes**
- **Strong adhesion to acrylic, ABS, and other injection molded plastics**
- **Oxidation resistant**
- **Non-magnetic**
- **Low VOC; HAP Free; Does not contain toluene, xylene, or MEK**

ENVIRONMENT
RoHS Compliant
Low-VOC

Usage Parameters

Properties	*Value*
Dry to Touch (liquid) [a)]	3 to 5 min
Recoat Time (liquid) [a)]	5 min
Drying Time @25 °C [77 °F]	24 h
Drying Time @65 °C [149 °F]	30 min
Shelf Life	2 y
Theoretical HVLP Spray Coverage [b)]	≤59 600 cm^2/L ≤5.96 m^2/L ≤225 000 in^2/gal ≤240 ft^2/gal

a) Assumes let 2:1 let down with MG 4351 Thinner 1 Cleaner Solvent
b) Idealized estimate based on a coat thickness of 25 μm [1.0 mil] and 65% transfer efficiency

Temperature Ranges

Properties	*Value*
Constant Service Temperature	-40 to 120 °C [-40 to 248 °F]
Storage Temperature Limits [b)]	-5 to 40 °C [23 to 104 °F]

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

Principal Components

Name	***CAS Number***
Silver	*7440-22-4*
Dimethyl carbonate	*616-38-6*
Acetone	*67-64-1*
Heptan-2-one	*110-43-0*

Properties of Cured 842ARTH

Electric & Magnetic Properties	*Method*	*Value*	
Volume Resistivity	Method 5011.5 in MIL-STD-883H	0.0001 Ω·cm	9337 S/cm
Surface Resistance		*Resistance*	*Conductance*
1 coat	Square probe	<0.01 Ω/sq [a)]	>100 S
2 coats	Square probe	<0.01 Ω/sq [a)]	>100 S
3 coats	Square probe	<0.01 Ω/sq [a)]	>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	

Physical Properties	*Method*	*Value*
Paint Type	—	Lacquer (Thermoplastic)
Color	Visual	Metallic silver grey
Abrasion Resistant	—	Yes
Blister Resistant	—	Yes
Peeling Resistant	—	Yes
Water Resistant	—	Yes
Mechanical Properties	***Method***	***Value***
Adhesion [b)]	ASTM D3359	5B
Pencil Hardness [b)]	ASTM D3363	3H, hard
Environmental & Ageing Study	***Method***	***Value***
Salt Fog Test @35 °C [95 °F], 96 h [b)]	ASTM B117-2011	
Resistivity before	MG-ELEC-120	<0.01 Ω/sq [a)]
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) Readings less than 0.01 Ω/sq are below the detection limit of the handheld multimeter and square probe method.
b) Tested on acrylonitrile butadiene styrene (ABS) material

The coating attenuation value is provided in Figure 1.

Shielding Attenuation

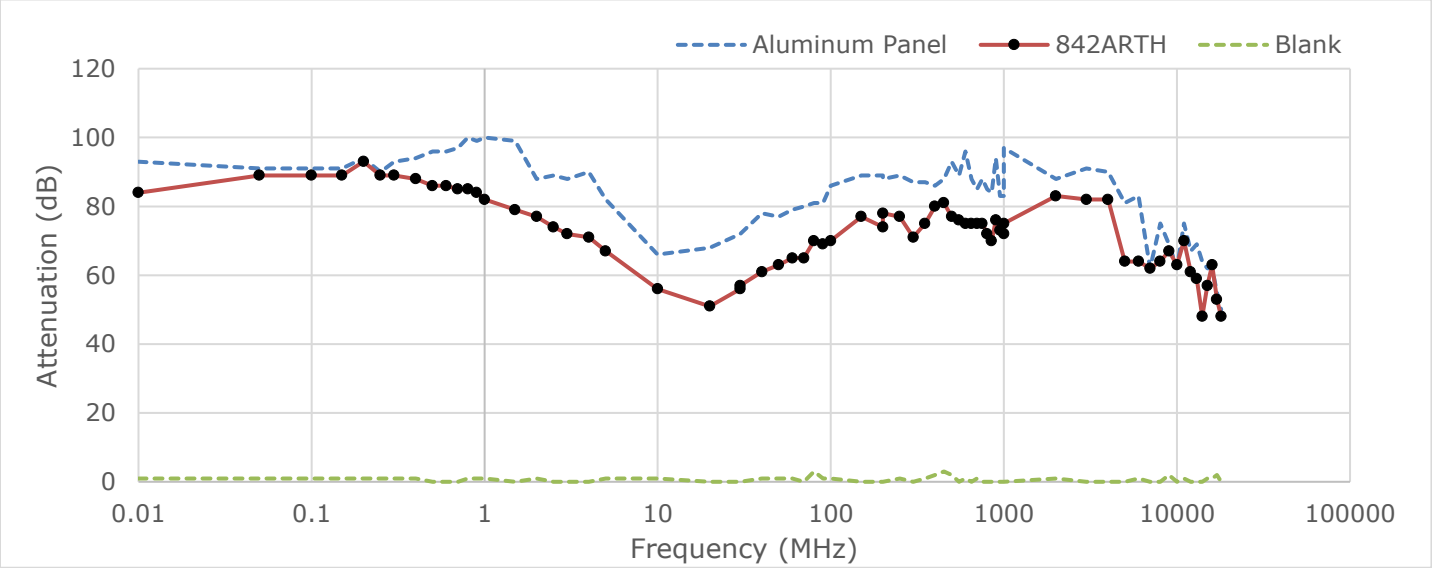

Figure 2. Attenuation of 842ARTH coating at different frequencies

Properties of Uncured 842ARTH

Physical Property	*Mixture*
Color	Metallic silver
Density @25 °C [77 °F]	1.7 g/mL
Solids Percentage (wt/wt)	61%
Viscosity @25 °C [77 °F] a)	~873 cP [~503 mm^2/s]
Flash Point	-17 °C [1.4 °F]
Odor	Acetone-like

a) Brookfield viscometer at 30 RPM with spindle LV S62

Compatibility

Chemical—The silver filler is quite resistant to oxidation, except in environments that contain contaminants like H_2S 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 842ARTH 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.

842ARTH Adherence Compatibility

Substrate	*Note*
Acrylonitrile Butadiene Styrene (ABS)	Chemically etches a) and adheres well to this substrate.
Polybutlylene Terephtalate (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! Do not use on thin plastics or on plastics where you want to keep original surface intact. The 842ARTH 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.

Health, Safety, and Environmental Awareness

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

Environmental Impact: The VOC (Volatile Organic Compound) content is 12% (206 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 842ARTH 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)

Application Instructions

The 842ARTH *Silver Conductive Coating* can be easily applied by the paintbrush, spray gun, or dip method.

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.

Material & Equipment

- Mixing spatula
- Clean paint brush ***OR*** HVLP spray gun ***OR*** dip tank systems
- Liquid agitator, agitated pot, or recirculation system
- Thinner/solvent
- Personal protection equipment (See 842ARTH-Liquid SDS)

Paint Dilution Ratios

For brush applications, the MG conductive paints are ready-to-use without dilution. You may however dilute it to help achieve better coat leveling and easier brush application.

For spray application, we recommend a 2:1 paint-to-thinner ratio as a starting point. To achieve the best results, adjust this dilution ratio based on the equipment and operator's preferences. The recommended thinner is the MG 4351 Thinner 1.

Surface Preparation

Clean oil, dust, water, solvents, and other contaminants and let the surface dry fully.

Spray Gun Application Instructions

Read the procedure below fully and make necessary adjustments to get the required coat thickness for your needs. For a 2:1 dilution, one spray coat typically results in a dry film thickness of roughly 1.0 mil [25 μm].

Spray Equipment

Use a HVLP (high-volume, low pressure) using the initial settings described in the following table. Adjust these settings and recommendations as required.

Initial Setting Recommendations

Air Cap	#3 HVLP		
Pressure	*Inlet*	*Air flow*	*Air cap*
	23 psi	13.5 SCFM [a)]	10 psi
Fluid Tip	1.3 mm [0.051"]	1.5 mm [0.059"] [b)]	

Note: These recommendations are based on a generic paint gun and may differ by brands. Please consult your spray gun manufacturer's guide.

a) SCFM = standard cubic foot per minute

b) If no or reduced let down is performed, this may be a better tip choice.

To apply the required thickness

1. Mix paint thoroughly with mechanized paint shaker, paint mixer, or spatula.
2. Let down the paint with a ***2:1*** (Paint:Thinner) ratio.
3. Make a test spray. Adjust the spray settings for best flow and spray quality, and establish an appropriate distance to avoid paint runs. A distance between 23 to 30 cm (9 to 12 in) is recommended.
4. Spray a thin and even coat onto a vertical surface to be coated. For best results, start your movement off-surface, press the trigger, and only release off-surface at the end of the stroke. Use a uniform movement of the spray gun parallel to the surface.
5. Wait 3 to 5 minutes 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 5 minutes (flash off time) at room temperature.

NOTE: Ideally, your spray gun will be equipped with liquid agitation system. If not, swirling the paint gun container slightly in between spray applications slows settling.

ATTENTION! Spraying overly thick coats may cause paint runs and hamper solvent evaporation. Prefer the application of many thin mist coats rather than fewer thicker wet coats.

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.

Packaging and Supporting Products

Cat. No.	*Packaging*	*Net Volume*		*Net Weight*		*Packaging Weight*	
842ARTH-150ML	Can	150 mL	5.07 fl oz	267 g	9.41 oz	TBD	TBD
842ARTH-900ML	Can	850 mL	1.79 pt	1.51 kg	3.33 lb	"	"
842ARTH-3.78L	Can	3.60 L	3.8 qt	6.4 kg	14.1 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.

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Warranty

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