

## Super Shield™ Nickel Conductive Coating

### Description

841AR is a conductive coating that consists of a one-part, solvent-based acrylic lacquer, pigmented with a highly conductive nickel flake. It is smooth, hard, and abrasion resistant. It can be easily applied by brush or spray. It has a quick dry time, with no heat cure necessary. It adheres strongly to most injection-molded plastics, such as ABS, PBT and PVA. It also provides strong corrosion resistance and is suitable for use in marine environments.

841AR provides a conductive coating for the interior of plastic electronic enclosures that suppresses EMI/RFI emissions. It excels when corrosion resistance is a concern.

### Features and Benefits

- *UL Recognized (File # [E202609](#))*
- *Provides effective EMI/RFI shielding over a broad frequency range*
- *Resistivity of  $4.0 \times 10^{-3} \Omega \cdot \text{cm}$*
- *Mild solvent system, and safe on polystyrenes*
- *HAP free—does not contain toluene, xylene, or MEK*

### Usage Parameters

Properties	Value
Touch dry or recoat time	3 min
Full cure @22 °C [72 °F]	24 h
Full cure @65 °C [149 °F]	30 min
Shelf life	3 y
Theoretical HVLP spray coverage per litre <sup>a)</sup>	$\leq 29\,600 \text{ cm}^2$ [ $\leq 2.96 \text{ m}^2$ ]
Theoretical HVLP spray coverage per US gallon <sup>a)</sup>	$\leq 17\,300 \text{ in}^2$ [ $\leq 120 \text{ ft}^2$ ]

**a)** Estimate based on a coat thickness of 50  $\mu\text{m}$  [2.0 mil] and 65% transfer efficiency

## Temperature Ranges

Properties	Value
Constant service temperature	-40–120 °C [-40–248 °F]
Intermittent temperature limit	-50–125 °C [-58–257 °F]
Storage temperature limits	-5–40 °C [23–104 °F]

## Cured Properties

Electric & Magnetic Properties	Method	Value
Resistivity	Method 5011.5 in MIL-STD-883H	0.0040 $\Omega$ -cm [250 S/cm]
Surface resistance <sup>a)</sup> 1 coat @1.6 mil 2 coats @4.0 mil 3 coats @5.8 mil	Square probe Square probe Square probe	0.52 $\Omega$ /sq 0.38 $\Omega$ /sq 0.29 $\Omega$ /sq
Magnetic class	—	Ferromagnetic
Relative permeability	—	$\geq 100$
Shielding attenuation, 51 $\mu$ m [2.0 mil] >10–100 kHz >100 kHz–1 MHz >1–10 MHz >10–100 MHz >100 MHz–1 GHz >1–10 GHz >10–18 GHz	IEEE STD 299-1997 IEEE STD 299-1997 IEEE STD 299-1997 IEEE STD 299-1997 IEEE STD 299-1997 IEEE STD 299-1997 IEEE STD 299-1997	84–89 dB 65–88dB 39–60 dB 32–52 dB 52–61 dB 56–74 dB 49–68 dB

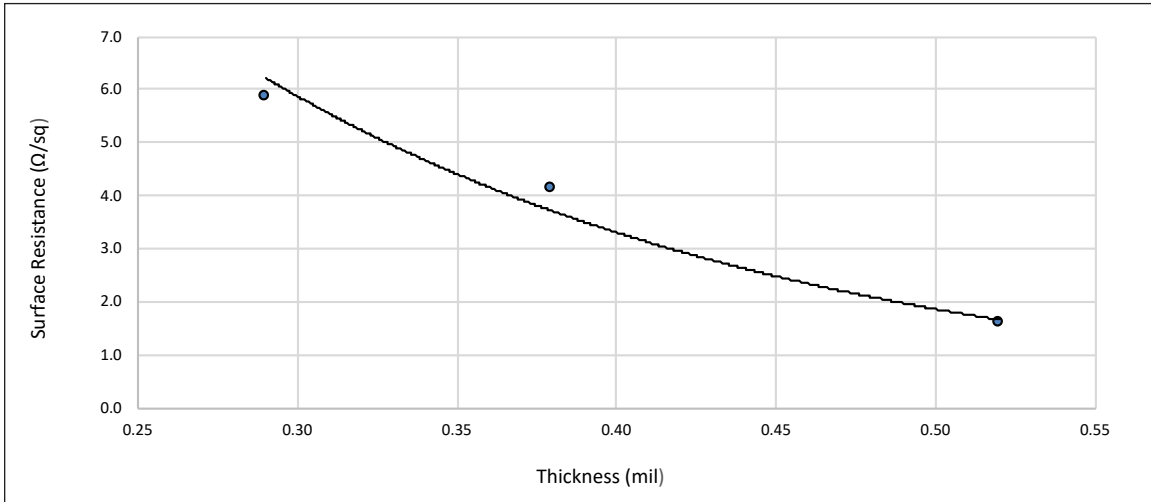
a) Surface resistance is given in  $\Omega$ /sq and the corresponding conductance in Siemens (S or  $\Omega$ ).

## Cured Properties

Physical Properties	Method	Value
Paint type	—	Lacquer (thermoplastic)
Color	Visual	Dark grey
Abrasion resistant	—	Yes
Blister resistant	—	Yes
Peeling resistant	—	Yes
Water resistant	—	Yes
Mechanical Properties	Method	Value
Adhesion (ABS)	ASTM D 3359	5B
(PC)	ASTM D 3359	5B
(PVC)	ASTM D 3359	5B
(Polyamide)	ASTM D 3359	5B
(Glass)	ASTM D 3359	0B
(Copper)	ASTM D 3359	0B
(Aluminum)	ASTM D 3359	0B
(Stainless steel)	ASTM D 3359	0B
(FR4)	ASTM D 3359	5B
(PP)	ASTM D 3359	0B
Pencil hardness (ABS)	ASTM D 3363	3H, Hard
Environmental & Ageing Study	Method	Value
Salt fog test @35 °C [95 °F], 96 h <sup>a)</sup>	ASTM B 117-2011	
Surface resistance before	MG-ELEC-120	380 mΩ/sq
Surface resistance after	MG-ELEC-120	510 mΩ/sq
Cross-hatch adhesion	ASTM D 3359-2009	5B
Cracking, unwashed area	ASTM D 661-93	None
Visual color, unwashed area	ASTM D 1729-96	Slightly darker

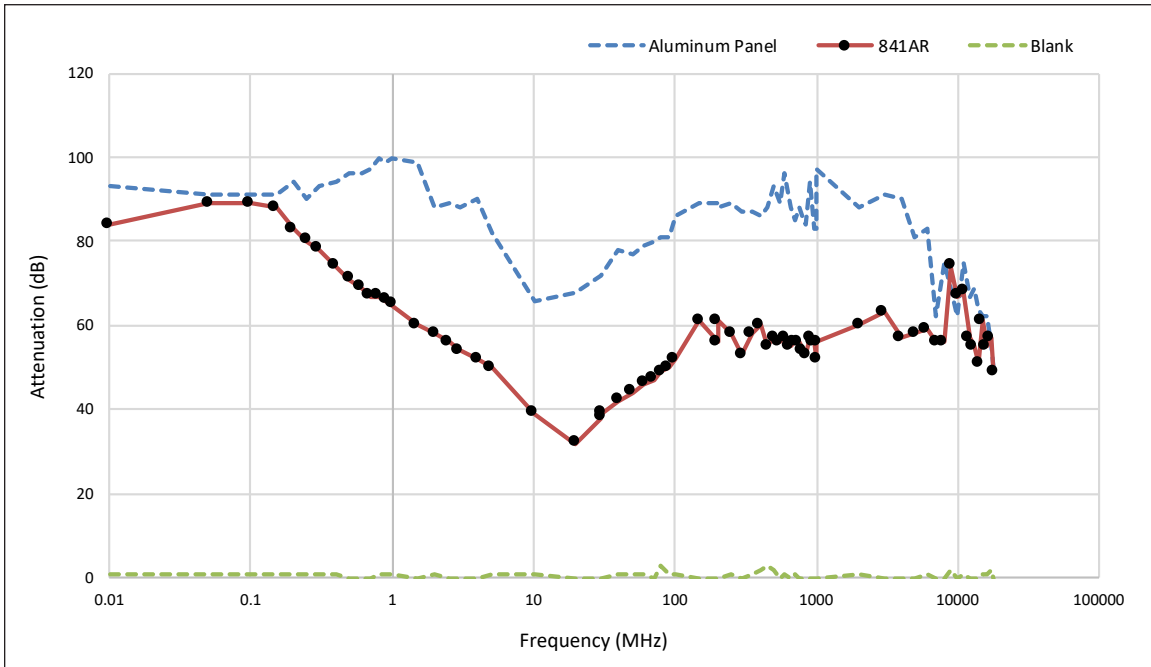
a) HVLP spray gun application on ABS coupons.

## Surface Resistance by Coating Thickness



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

## Shielding Attenuation



**Figure 2.** Attenuation of 841AR coating at different frequencies. Test performed with a 2 coat thickness.

## Uncured Properties

Physical Properties	Method	Value
Color	Visual	Dark grey
Odor	—	Acetone-like
Viscosity @25 °C [77 °F] <sup>a)</sup>	Brookfield viscometer	1 460 cP [863 mm <sup>2</sup> /s]
Density @25 °C [77 °F]	ASTM D 1475	1.7 g/mL
Flash point	—	-17 °C [1.4 °F]
Solids content (wt/wt)	Calculated	57%

a) Brookfield viscometer at 20 RPM with spindle LV S62.

## Compatibility

**Chemical Resistance**—Nickel has good resistance to oxidation in a variety of corrosive environments, including marine environments. In normal atmosphere or freshwater, nickel 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, providing greater durability.

The thermoplastic resin is dissolved by common paint solvents like toluene, xylene, acetone and MEK. This allows for easy repair and rework of the coating, but makes it unsuitable for use in solvent-rich environments.

**Adhesion**—The coating adheres to most plastics used to house printed circuit assemblies; however, it is not compatible with contaminants like water, oil, or greasy flux residues that may affect adhesion. If contamination is present, first clean the surface to be coated with MG Chemicals 824 Isopropyl alcohol.

## Storage

Store between -5 and 40 °C [23 and 104 °F] in a dry area, away from sunlight.

## Health and Safety

Please see the 841AR-Liquid Safety Data Sheet (SDS) for further details on transportation, storage, handling, safety guidelines, and regulatory compliance.

## Application Instructions

For best results, follow the procedure below. If you have little or no experience, refer to the [Application Guide](#).

### Spray Equipment

The spray gun recommendations below are based on generic paint guns and may vary by brands. Consult your spray gun manufacturer's guide.

### Initial Setting Recommendations

<b>Air Cap</b>	HVLP (high volume, low pressure) or LVMP (low volume, medium pressure)		
<b>Pressure</b>	Inlet: 23 psi	Air flow: 13.5 SCFM <sup>a)</sup>	Air cap: 10-15 psi
<b>Fluid Tip</b>	0.8–1.3 mm		

a) Standard cubic foot per minute

### Spraying:

1. Dilute coating with 435 Thinner or 4351 Thinner 1. Adjust ratio if required.
2. Mix coating thoroughly with a spatula or mechanized paint mixer.
3. Spray a test pattern to ensure good flow quality.
4. At an approximate distance of 20–25 cm (8–10 in), tilt the board 45° from a vertical position and spray a thin and even coat. Use spray-and-release strokes with an even motion to avoid excess paint in one spot. Start and end each stroke off the surface.
5. Wait 3 min before applying another coat to avoid trapping solvent.
6. Rotate the board 90° and spray again to ensure good coverage.
7. Apply other coats until desired thickness is achieved (go to step 3).
8. Let dry for 3 min at room temperature before heat cure.

### Brushing:

1. Mix coating thoroughly with a spatula or mechanized paint mixer.
2. Use a foam or roller brush to coat the board. Use long, smooth strokes to create an even coat.

### Selective coating:

Custom blended solutions are available and have been verified for use with selective coating machines using both non-atomised and film coating applicators. To inquire about a custom solution tailored to your equipment, contact MG Chemicals' Technical Support for assistance.

## Cure Instructions

### Room temperature cure:

- Let cure at room temperature for 24 h.

### Heat cure:

- Put in oven at 65 °C [149 °F] for 30 min.

## Packaging and Supporting Products

Cat. No.	Packaging	Net Volume	Net Weight	Packaged Weight
841AR-150ML	Can	150 mL [5.0 fl oz]	253 g [8.93 oz]	310 g [0.68 lb]
841AR-900ML	Can	850 mL [1.79 pt]	1.43 kg [3.16 lb]	1.50 kg [3.31 lb]
841AR-3.78L	Can	3.60 L [3.8 qt]	6.07 kg [13.3 lb]	6.80 kg [15.0 lb]
841AR-340G	Aerosol	232 mL [7.84 fl oz]	340 g [12 oz]	426 g [0.94 lb]
841AR-P	Pen	5 mL [0.16 fl oz]	7.57 g [0.26 oz]	31 g [0.07 lb]

## Thinners & Conductive Coating Removers

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

## Technical Support

Please contact us regarding any questions, suggestions for improvements, or problems with this product. Application notes, instructions and FAQs are located at [www.mgchemicals.com](http://www.mgchemicals.com).

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