

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 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 $7.6 \times 10^{-3} \Omega \cdot \text{cm}$*
- *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 340G spray can coverage ^{a)}	≤2 500 cm ² [≤390 in ²]

a) Estimate based on a coat thickness of 50 µm [2.0 mil] and 50% 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	0.0076 Ω ·cm [130 S/cm]
Surface resistance ^{a)} 1 coat @2.1 mil 2 coats @4.2 mil 3 coats @6.1 mil	Square probe Square probe Square probe	0.62 Ω /sq 0.38 Ω /sq 0.34 Ω /sq
Magnetic class	—	Ferromagnetic
Relative permeability	—	≥ 100
Shielding attenuation, 51 μ 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 65–88 dB 39–60 dB 32–52 dB 52–61 dB 56–74 dB 49–68 dB
Physical Properties	Method	Value
Paint type	—	Lacquer (thermoplastic)
Color	Visual	Dark grey
Abrasion resistant	—	Yes
Blister resistant	—	Yes
Peeling resistant	—	Yes
Water resistant	—	Yes

a) Surface resistance is given in Ω /sq and the corresponding conductance in Siemens (S or Ω^{-1}).

Cured Properties

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	HB, soft
Environmental & Ageing Study	Method	Value
Salt fog test @35 °C [95 °F], 96 h ^{a)}	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

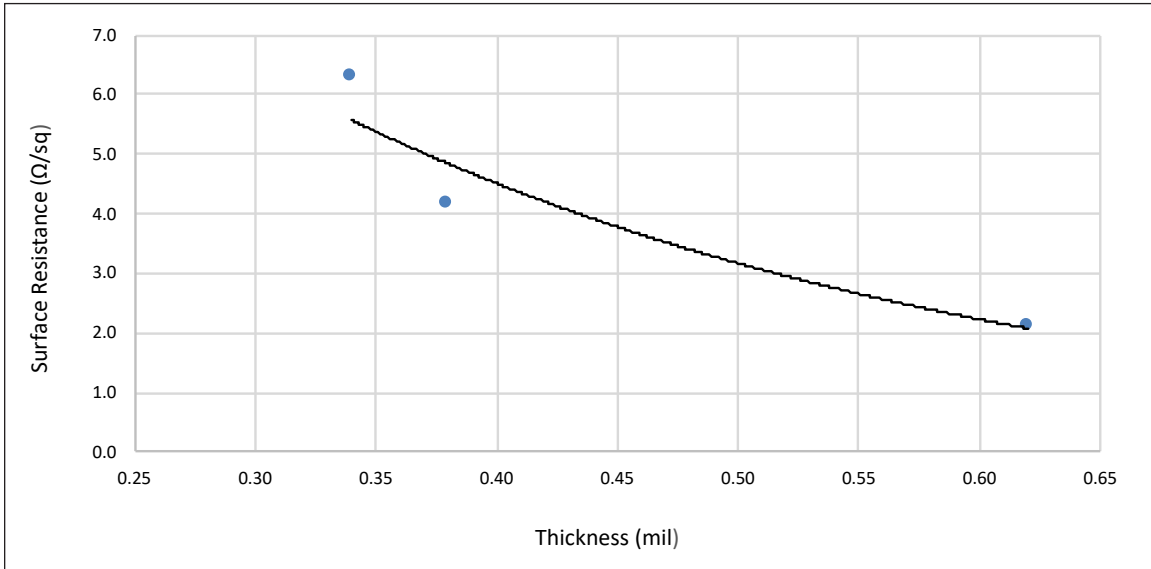


Figure 1. Nickel conductive coating surface resistance at different thicknesses (the dots indicate typical successive coat thicknesses)

Shielding Attenuation

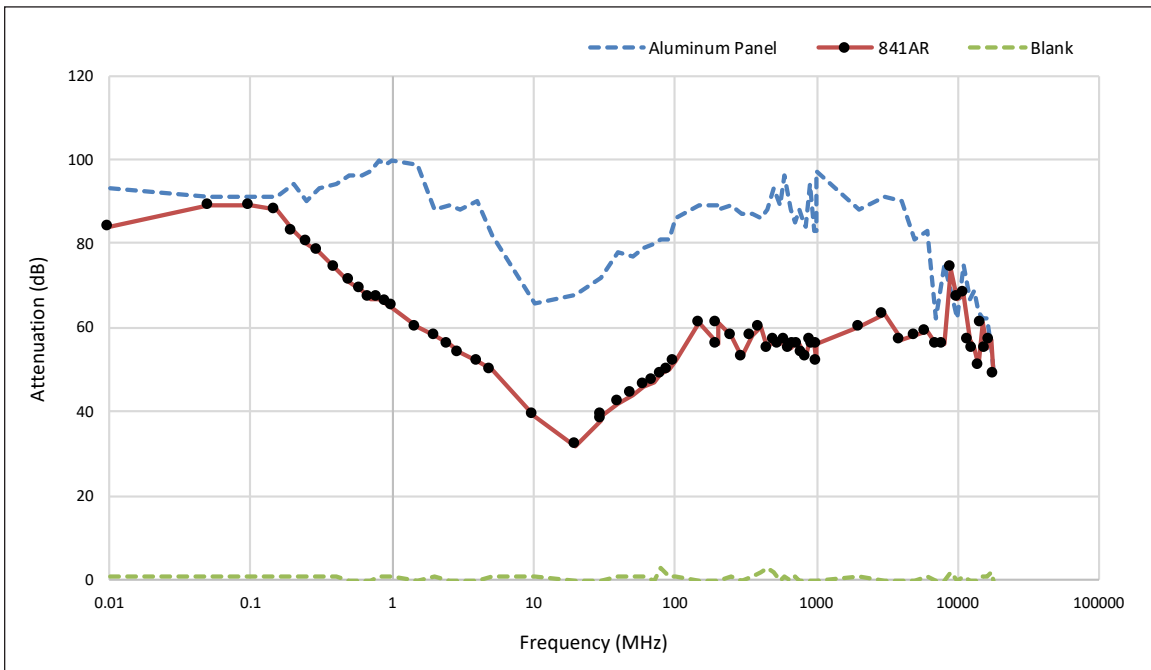


Figure 2. Attenuation of 841AR coating at different frequencies. Test performed with a 2 coat thickness.

Uncured Properties

Physical Properties	Method	Value
Color	Visual	Dark grey
Odor	—	Ethereal
Viscosity @25 °C [77 °F] ^{a)}	Brookfield viscometer	61 cP [45 mm ² /s]
Density @25 °C [77 °F]	ASTM D 1475	1.3 g/mL
Flash point	—	-17 °C [1.4 °F]
Solids content (wt/wt)	Calculated	38%

a) Brookfield viscometer at 60 RPM with spindle LV S61.

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. Temperatures below or above these outer limits will result in the container being crushed and/or ruptured.

Health and Safety

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

Application Instructions

Spraying:

1. Shake the can vigorously.
2. Spray a test pattern to ensure good flow quality.
3. 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.
4. Wait 3 min before applying another coat to avoid trapping solvent.
5. Rotate the board 90° and spray again to ensure good coverage.
6. Apply other coats until desired thickness is achieved (go to step 3).
7. Let dry for 3 min at room temperature before heat cure.

Clearing nozzle between use:

1. Invert the can upside down.
2. Hold button until clear propellant comes out. The propellant should clear in seconds.

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-340G	Aerosol	232 mL [7.84 fl oz]	340 g [12 oz]	426 g [0.94 lb]
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-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.

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