

Description

The 841 *Super Shield Nickel Conductive Coating* is a conductive acrylic paint designed to reduce electromagnetic or radio frequency interference (EMI/RFI)—an issue for all electronic devices. Long-term protection from EMI/RFI is assured by its oxidation resistant flakes and durable acrylic binder.

The acrylic binder minimizes loss of metallization through rubbing, and paint peeling. The 841 coating is UL approved for adhesion to ABS and polycarbonates at both hot and cold temperatures.

The high oxidation resistance of the high-purity nickel flakes ensures a long-term conductivity that will not degrade quickly over time, making it suitable for marine and other harsh environments. In cases of degradation, the coating is removable or repairable to re-establish the desired shielding performance.

Applications & Usages

The 841 paint is well suited for coating the interior of plastic electronic enclosures and offers a simple way to deal with EMI/RFI issues, allowing devices to pass FCC emission testing. Its primary applications are in cell phones, PDA's, other consumer electronics, telecommunication equipment, industrial equipment, medical devices, military devices, and aerospace equipment. Furthermore, it can be used to shield entire rooms that will be over-coated with a decorative acrylic paint. Other applications include providing electric continuity for circuits and protecting conductive metal surfaces prone to oxidation.

Benefits and Features

- **UL Recognized** (File # [E202609](#))
- **Tested in compliance with IEEE Std. 299-1997**
- **High Conductivity—0.0042 Ω·cm; 0.6 Ω/sq for one coat**
- **Repairable and removable thermoplastic paint system**
- **Tough and durable coat, salt spray tested with excellent weatherability**
- **Stronger adhesion than water based coatings**
- **Median attenuation 50 dB ±25 dB** per 38 μm (~1.5 mil) for frequency range of 10 to 18,000 MHz

ENVIRONMENT

RoHS Compliant
Low-VOC



Curing & Work Schedule

Properties	Value
Dry to Touch (aerosol)	30 to 45 s
Recoat time (aerosol)	1 min
Full Cure (at room temp.)	24 hour
Full Cure (at 65 °C)	30 min
Shelf Life	3 y
Storage Temperature Limits ^b	-5 to +40 °C [+23 to +104°F]

a) The working life assumes room temperature.

b) 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

Properties	Value
Service Temperature	-40 to +120 °C [-40 to +248 °F]
Maximum coverage for 38 μm [1.5 mil] ^c	<8 400 cm ² [<9 ft ²]

c) Typical thickness for first coat



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

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841-Aerosol

Principal Components

Name	CAS Number
Nickel Flake (High Purity)	7440-02-0
Acrylic Resin	9003-01-4
Toluene	108-88-3
Acetone	67-64-1

Properties of Cured 841

<i>Electric Properties</i>	<i>Method</i>	<i>Value</i>
Volume Resistivity ^{a)}	Method 5011.5 in MIL-STD-883H	0.0042 Ω·cm
Surface Resistance		<i>Resistance</i> <i>Conductance</i>
: 1 × coat (~1.50 mil)	Square probe	≤0.7 Ω/sq 1 S
: 2 × coats (~2.75 mil)	Square probe	≤0.3 Ω/sq 3 S
: 3 × coats (~3.75 mil)	Square probe	≤0.2 Ω/sq 5 S
Shielding Attenuation ^{b)} for 33 μm [1.5 mil]	IEEE STD 299-1997	
10 to 100 kHz	"	42 dB to 75 dB
100 kHz to 1 MHz	"	42 dB to 69 dB
1 MHz to 10 MHz	"	40 dB to 69 dB
10 MHz to 100 MHz	"	24 dB to 40 dB
100 MHz to 1 GHz	"	29 dB to 48 dB
1 GHz to 10 GHz	"	31 dB to 57 dB
10 GHz to 18 GHz	"	31 dB to 58 dB
<i>Physical Properties</i>	<i>Method</i>	<i>Value</i>
Resin technology	—	Lacquer (Thermoplastic)
Color	Visual	stainless steel
Abrasion resistant		Yes
Blister resistant		Yes
Peeling resistant		Yes
Water and salt spray 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	Trace fading
Peeling, unwashed area	ASTM D1729-96	None

Note: One coat thickness is typically around 38 μm [1.5 mil].

a) Tested by an external and independent laboratory using four point probe

b) Shield attenuation (with respect to a reference sample without shield isolation) is given for adjacent frequency ranges and provides the minimal and maximal value registered within these ranges.

Surface Resistance by Coating Thickness

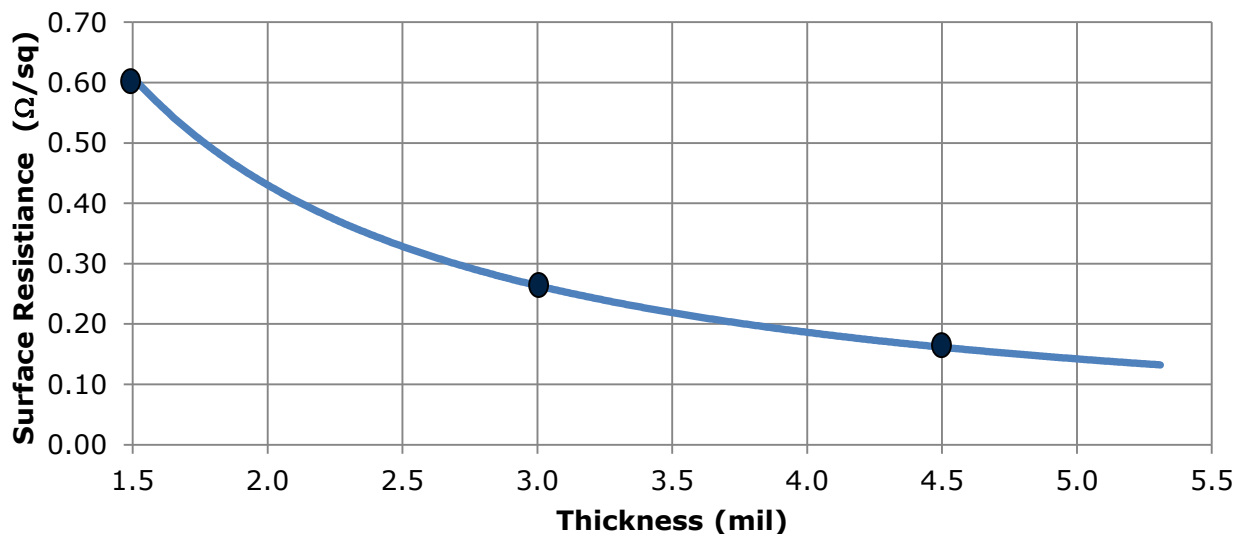


Figure 1. Nickel conductive coating surface resistance at different thicknesses (the dots indicate typical successive coat thicknesses)

Properties of Uncured 841

<i>Physical Property</i>	<i>Mixture</i>
Color	Steel Grey
Viscosity at 25 °C [77 °F] ^a	100 cP [0.1 Pa·s]
Density	1.24 g/mL
Solids Percentage (wt/wt) ^b	~41%
Flash Point	-18 °C [-0.4 °F]
Odor	Ethereal

a) Brookfield viscometer at 30 RPM with spindle LV4

b) Percentage for liquid only (without propellant)



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841-Aerosol

Compatibility

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

The thermoplastic resin dissolves in common paint solvents like toluene, xylene, acetone, and MEK. This gives great coating repair and rework characteristics, but it makes this coating unsuitable for solvent rich environments.

Adhesion—The 841 coating adheres to ABS, PBT, and most materials found on 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.

841 Adherence Compatibility

<i>Substrate</i>	<i>Note</i>
Acrylonitrile Butadiene Styrene (ABS)	UL tested substrate, superior adhesion ^a
Polybutylene Terephthalate (PBT)	UL tested substrate, superior adhesion ^a
Acrylics or acrylic paints	Adheres well to clean surface
Polycarbonate	Adheres well to clean surface
Polyvinyl Acetate (PVA)	Adheres well to clean surface
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 841 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 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 841 **Material Safety Data Sheet** (MSDS) for greater details on transportation, storage, handling and other security guidelines.

Environmental Impact: The volatile organic content is 10% (115 g/L) by EPA and WHMIS standards.



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

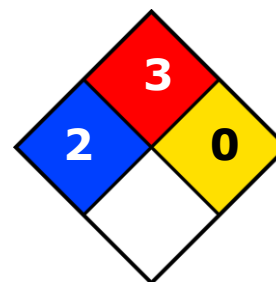
Health and Safety: The solvents in 841 can ignite if exposed to flames or sparks and can cause respiratory track irritation. Use in well-ventilated area.

Solvents and Nickel can cause skin irritation or allergies. Wear safety glasses or goggles and disposable gloves to avoid exposures. Do not ingest.

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

Follow the procedure below for best results. We recommend a coat with a dry film thickness of roughly ≥ 1.5 mil [$33 \mu\text{m}$]. For best results, apply many thin coats as opposed to using fewer thick coats.

Prerequisites

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

To apply the required thickness

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.

ATTENTION!

- Failure to hold can vertical during spray application may result in uneven application with time.
- Coats that are applied too thick cause runs and hampers solvent evaporation.
- Spraying onto horizontal surfaces is not recommended.



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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

NOTE: 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

<i>Cat. No.</i>	<i>Form</i>	<i>Net Volume</i>	<i>Net Weight</i>	<i>Shipping Weight</i>
841-340G	aerosol	0.375 L 12 fl oz	0.21 kg 0.47 lb	0.3 kg ^a 0.6 lb ^a
841-900ML	Liquid	0.9 L 0.24 gal	1.5 kg 3.3 lb	1.8 kg 4 lb
841-1G	Liquid	3.8 L 1.0 gal	6 kg 13.7 lb	7 kg 15 lb

a) pack of 6 cans

Supporting Products

- Thinner/Cleaner 435-1L (*for quick cure and most normal substrates*)
- Thinner/Cleaner 4351-1L (*for slow cure and sensitive plastics substrates*)



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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

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.

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