Super Shield™ Conductive Nickel Coating 841 Technical Data Sheet

841-Aerosol

Description

The 841 *Super Shield Nickel Conductive Coating* is a UL recognized one-part durable acrylic lacquer pigmented with a highly conductive nickel 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 strong adhesion to plastics, excellent conductivity, and strong corrosion resistance, even in marine environments.

Applications & Usages

The 841 is designed to provide a conductive coating to the interior of plastic electronic enclosures to suppress EMI/RFI emissions. It excels when corrosion resistance is a concern.

The 841 is commonly used by manufacturers of these devices:

- Sensors
- Controllers
- Receivers
- Test Equipment
- Scientific equipment
- Medical Equipment
- Communication devices
- Satellite dishes and radar systems
- Antennas
- Aerospace applications
- Electric vehicles
- Cable boxes
- Networking gear, firewalls
- Military equipment
- Cellphones, laptops, PDA's
- GPS's, navigation systems
- TV's, monitor's, and displays
- Consumer electronics
- Electronic sporting equipment
- Audio equipment
- Electric guitars and other amplified instruments
- Drones and other RC vehicles

Other applications for 841 include:

- Repairing damage to existing shielding
- Conductive undercoat for electroplating
- Protecting metal surfaces from oxidation
- Providing electric continuity for circuits
- Grounding

Benefits and Features

- **UL Recognized** (File # E202609)
- **Tested in compliance with IEEE Std. 299-1997**
- **Provides effective EMI/RFI shielding over a broad frequency range**
- **Volume resistivity of 0.0042 Ω·cm**
- **Smooth, durable and, abrasion resistant**
- **Available in liquid format**
- **Quick dry time, no heat cure required**
- **Strong adhesion to acrylic, ABS, polycarbonate, and other injection molded plastics**
- **Excellent adhesion to wood, ceramics, copper, and aluminum**
- **Corrosion resistant, suitable for marine environments**

ENVIRONMENT
RoHS Compliant
Low-VOC

Rev. Date: 13 September 2016 / Ver. 2.00

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Usage Parameters

Properties	*Value*
Dry to Touch (aerosol)	3 to 5 min
Recoat Time (aerosol)	2 min
Drying Time @25 °C [77 °F]	24 h
Drying Time @65 °C [149 °F]	30 min
Shelf Life	≥3 y
Theoretical 340G Spray Can Coverage [a]	≤2 100 cm^2 ≤330 in^2

a) The working life assumes room temperature. 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 [b]	-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***
Nickel Flake (high purity)	*7440-02-0*
Acrylic Resin	*9003-01-4*
Toluene	*108-88-3*
Acetone	*67-64-1*

Properties of Cured 841

Electric Properties	*Method*	*Value*	
Volume Resistivity [a]	Method 5011.5 in MIL-STD-883H	0.0042 Ω·cm	
Surface Resistance		*Resistance*	*Conductance*
1 coat @1.5 mil	Square probe	0.7 Ω/sq	1 S
2 coats @2.8 mil	Square probe	0.3 Ω/sq	3 S
3 coats @3.8 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	"	79 dB to 88 dB	
>100 kHz to 1 MHz	"	53 dB to 88 dB	
>1 MHz to 10 MHz	"	19 dB to 53 dB	
>10 MHz to 100 MHz	"	19 dB to 39 dB	
>100 MHz to 1 GHz	"	36 dB to 49 dB	
>1 GHz to 10 GHz	"	32 dB to 48 dB	
>10 GHz to 18 GHz	"	30 dB to 48 dB	

Physical Properties	*Method*	*Value*
Paint Type	—	Lacquer (Thermoplastic)
Color	Visual	stainless steel
Abrasion Resistant		Yes
Blister Resistant		Yes
Peeling Resistant		Yes
Water and Salt Spray Resistant	—	Yes
Environmental & Ageing Study	***Method***	***Value***
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

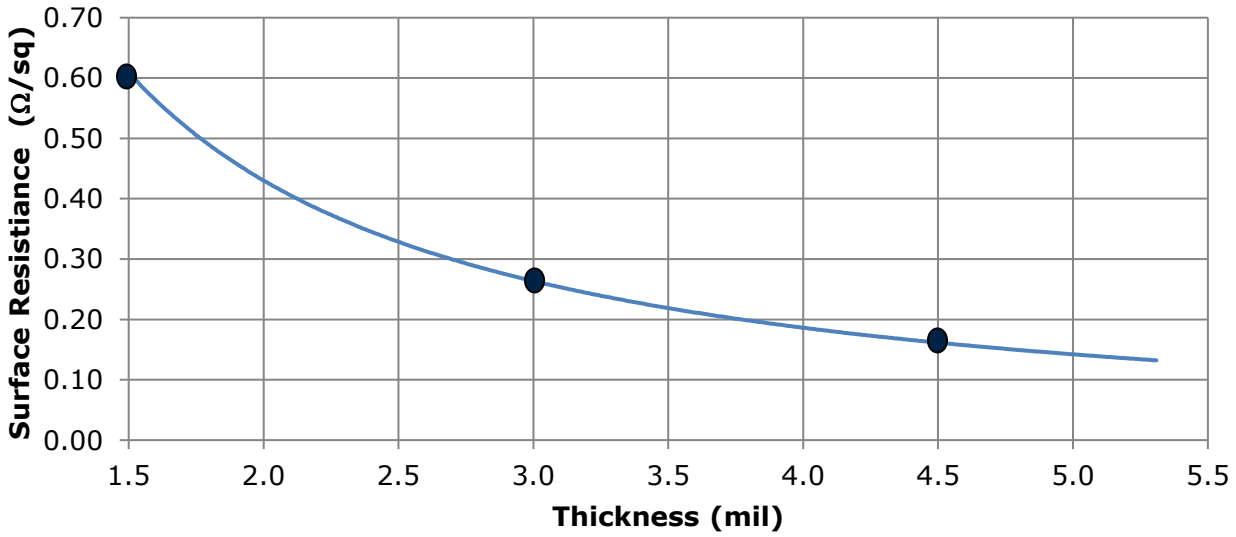


Figure 1. Nickel conductive coating surface resistance at different thicknesses (the dots indicate typical successive coat thicknesses)

Properties of Uncured 841

Physical Property	*Mixture*
Color	Dark Grey
Viscosity @25 °C [77 °F] a)	≤3 920 cP
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)

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

Substrate	*Note*
Acrylonitrile Butadiene Styrene (ABS)	UL tested substrate, superior adhesion a)
Polybutlylene Terephtalate (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 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 841 **Safety Data Sheet** (SDS) 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.

RoHS COMPLIANT

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

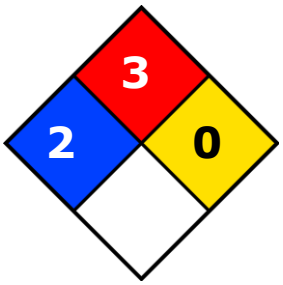
Health and Safety: The solvents in 841 can ignite if exposed to flames or sparks and can cause respiratory track irritation. Use in well-ventilated area.

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 μm]. 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 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 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.

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

Cat. No.	*Packaging*	*Net Volume*	*Net Weight*	*Packaging Weight*
841-340G	Aerosol	277 mL 9.36 fl oz	340 g 11.9 lb	0.3 kg [a)] 0.6 lb [a)]

a) Pack of 6 cans

Thinners & Conductive Coating Removers

- *Thinner*: Cat. No. 435-1L, 435-4L
- *Thinner 2*: 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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