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

Super Shield™ Conductive Nickel Coating 841 Technical Data Sheet

841-Liquid

Description

The 841 Super Shield Conductive Coating reduces electromagnetic or radio frequency interference (EMI/RFI), an issue for all electronic devices. It is a durable acrylic coating pigmented with a high purity nickel flake, and is UL approved for adhesion to ABS and polycarbonates at hot and cold temperatures.

It is designed to be applied to the interior of plastic electronic enclosures, and is a simple way to deal with EMI/RFI issues, allowing devices to pass FCC emission testing.

Applications & Usages

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.

Benefits

- **UL Recognized** (File # E202609)
- **Tested in compliance with IEEE Std. 299-1997**
- **High Conductivity—Low Surface resistivity** of 0.6 Ω/sq for one coat
- **Tough and durable coating**
- **Stronger adhesion than water based coatings**
- **Low VOC's**
- **Median attenuation 50 dB ±25 dB** per 38 μm (~1.5 mil) for frequency range of 10 to 18,000 MHz

Curing & Work Schedule

Properties	*Value*
Dry to Touch (liquid) Recoat time (liquid)	3 to 5 min 2 min
Full Cure (at room temp.) Full Cure (at 65 °C) Shelf Life	24 hour 60 min 3 year
Storage Temperature Limits	-5 to +40 °C [+23 to +104°F]

a) Assumes let 1:1 let down with MG 435 or 4351 Thinner Cleaner Solvent
b) The product must stay within the storage temperature limits stated.

Service Ranges

Properties	*Value*
Service Temperature	-40 to +120 °C [-40 to +248 °F]
Maximum coverage per liter[c)]	<100 000 cm^2 [<107 ft^2]
Maximum coverage per US gallon[c)]	<420 000 cm^2 [<453 ft^2]

c) Idealized estimate based on a coat thickness of 38 μm [1.5 mil] and 65% transfer efficiency.

Rev. Date: 22 December 2011 / Ver. 1.02

Principal Components

Name	***CAS Number***
Nickel Flake (High Purity)	*7440-02-0*
Acrylic Resin	*9003-01-4*
Talc	14807-96-6
Toluene	*108-88-3*
Acetone	*67-64-1*

Properties of Cured 841

Electric Properties	***Method***	***Value***
Surface Resistance : 1 × coat (~1.50 mil)		≤0.6 Ω/sq
: 2 × coats (~3.00 mil)		≤0.25 Ω/sq
: 3 × coats (~4.50 mil)		≤0.15 Ω/sq
Magnetic class		Ferromagnetic (magnetic)
Relative permeability		≥100
Shielding Attenuation[a] 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

Physical Properties	***Method***	***Value***
Resin technology		Thermoplastic
Color		Steel grey
Abrasion resistant		Yes
Blister resistant		Yes
Peeling resistant		Yes
Water and salt spray resistant		Yes

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

a) 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

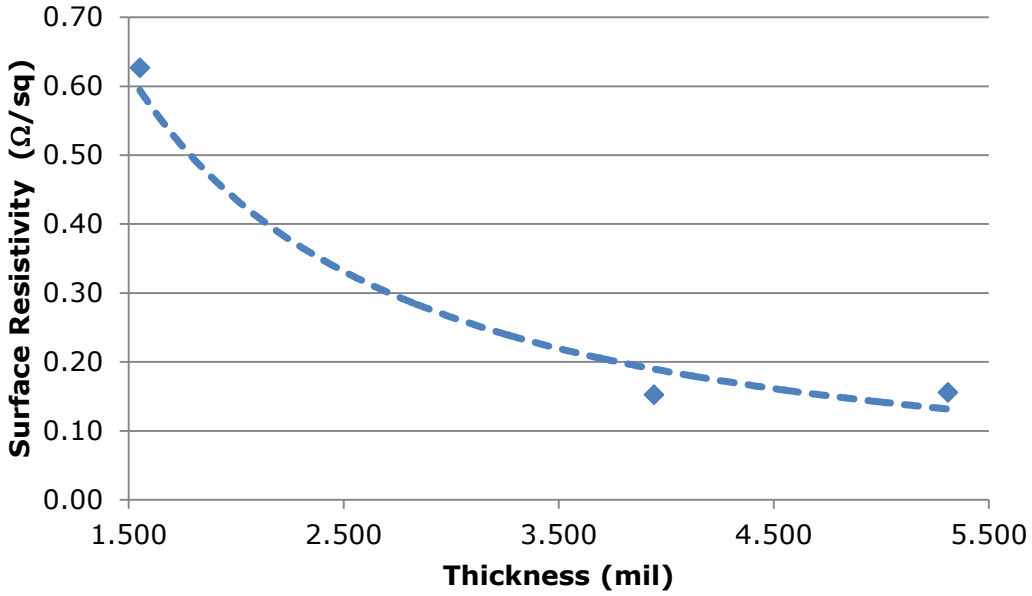


Figure 1. Nickel conductive coating surface resistivity for one, two, and three coats thickness

Properties of Uncured 841

Physical Property	*Mixture*
Color	Steel Grey
Viscosity at 25 °C [77 °F][a)]	3920 cP [3.92 Pa·s]
Density	1.65 g/mL
Solids Percentage (wt/wt)[b)]	~65%
Flash Point[b]	-18 °C [-0.4 °F]
Odor	Ethereal

a) Brookfield viscometer at 30 RPM with spindle LV4
b) Based on flash point acetone

Compatibility

Chemical—Nickel has good resistance to oxidation in a variety of corrosive 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[a)]
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 838 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.

For chemically sensitive substrates, use the 4351-1L thinner lessens the etching effects.

Storage

Store between -5 °C and 40 °C [23°F and 104 °F] in dry area.

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.

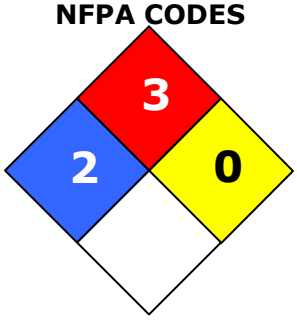
Environmental Impact: The volatile organic content is 27.5% (453 g/L) by EPA and WHMIS standards.

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

HMIS RATING

HEALTH:	**2**
FLAMMABILITY:	**3**
PHYSICAL HAZARD:	**0**
PERSONAL PROTECTION:	

NFPA CODES



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.

Application Instructions

The 841 Super Shield can be easily applied by the paint brush, spray gun, or dip method.

NOTE: In all cases, the mixture should be kept slightly agitated during use to avoid premature settling of the solids.

For best results, apply many thin coats as opposed to using fewer thick coats. We recommend a coat with a dry film thickness of roughly 1.5 mil [33 μm]. Follow the procedure below for ensure optimal conductivity.

Prerequisites

Clean and dry the surface of the substrate to remove

- Oil, dust, water, solvents, and other contaminants
- Mixing spatula
- Clean paint brush ***OR*** HPLV spray gun ***OR*** dip tank system
- Thinner/Cleaner solvent
- Personal protection equipment (See 841-Liquid MSDS)

Spray Gun Application Instructions

Read the procedure below fully and make necessary adjustments to get the required coat thickness for your needs. Typically, one coat results in a dry film thickness of roughly 1 to 1.5 mil [25 to 38 μm].

Spray Equipment

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

Initial Setting Recommendations

Air Cap	#3 HPLV		
Pressure	*Inlet* 23 psi	*Air flow* 13.5	*Air cap* 10 psi
Fluid Tip	1.3 mm	(1.5 mm)[a)]	

Note: These recommendations are based on a DeVilbiss FinishLine paint gun, and may differ with other brands. Please consult your spray gun manufacturer's guide.

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

To apply the required thickness by weight

1. Mix paint thoroughly with a spatula or with mechanized paint mixer.
2. Let down the paint with at a ***1:1*** (Paint:Thinner) ratio.
3. Spray a test pattern. This step ensures good flow quality and helps establish appropriate distance to avoid runs.
4. At a distance of 23 to 30 cm (9 to 12 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.
5. Wait 2 to 3 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: Swirling the paint gun container slightly while waiting prevents settling.

ATTENTION!

- Coats that are applied too thick cause runs and hampers solvent evaporation. Prefer the application of many mist coats rather than fewer thicker wet coats.
- Spraying onto horizontal surfaces is not recommended due to possible uneven settling of metallic filler.

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.

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.	*Form*	*Net Volume*		*Net Weight*		*Shipping Weight*	
841-340G	aerosol	0.375 L	12 oz	0.21 kg	0.47 lb	0.3 kg [a]	0.6 lb [a]
841-900ML	Liquid	0.9 L	0.24 gal	1.6 kg	3.6 lb	1.9 kg	4.2 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 4351-1L (*for sensitive plastics*) or 435-1L (*for quick cure on other substrates*)

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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