



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

Super Shield™ Water Based Nickel Conductive Coating 841WB Technical Data Sheet

841WB-Liquid

Description

The 841WB *Super Shield™ Water Based Nickel Conductive Coating* is a one-part urethane system pigmented with highly conductive nickel flake. It is easy to use, with no let-down, and no heat cure necessary. It can be applied by spray, brush, or roller. The cured coating is smooth, durable, and adheres well to plastics, wood, metal, and ceramics. It also bonds well to drywall and can be painted over with common architectural paints.

Applications & Usages

This coating provides effective EMI/RFI shielding across a broad range of frequencies in architectural and electronic applications.

Water based conductive paints are the only choice for architectural RFI shielding applications because VOC regulations prohibit the use of solvent based systems. Such applications include containing RFI within a room such as an engine room to prevent interference across other rooms. Also, it can be used to protect a room containing sensitive electronic equipment from general sources of interference, such as server rooms, recording studios, laboratories, and surgical rooms, especially those near cell phone or radio towers.

This product is also great for providing EMI/RFI shielding to electronic enclosures, sensors, test equipment, portable controllers, communication devices, and most applications where one would normally use solvent based shielding.

This product also good for repairing conductive traces, and electronic prototyping.

Benefits and Features

- **Provides effective EMI/RFI shielding over a broad range of frequencies**
- **Can be applied by spray gun, roller, or brush**
- **One-part, ready-to-use system—no dilution required**
- **Excellent adhesion to drywall and plastics**
- **Can be painted over with common architectural paints**
- **Safe even on the most delicate plastics**
- **Good environmental resistance**
- **Non-flammable**
- **No noxious odors**
- **Not regulated for air transport (non-DG)**
- **Cures at room temperature**
- **Low Regulated VOC content allows for use in architectural applications**

ENVIRONMENT
RoHS Compliant
Low-VOC



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841WB-Liquid

Usage Parameters

Properties	Value
Recoat Time (for plastic)	30 min
Recoat Time (for dry wall)	7 min
Drying Time @25 °C [77 °F]	24 h
Drying Time @65 °C [149 °F]	3 h
Shelf Life	1 y
Theoretical HVLP Spray Coverage ^{a)}	≤15 200 cm ² /L ≤1.5 m ² /L ≤8 900 in ² /gal ≤62 ft ² /gal

a) Idealized estimate based on a coat thickness of 51 µm [2.0 mil] and 65% 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	-20 to 27 °C [-4 to 80 °F]

WARNING! The product gels below 0 °C [32 °F]. If the product was exposed to freezing temperature, keep at 22 °C [72 °F] for 2 days prior to use.

Properties of Uncured 841WB

Physical Property	Mixture
Color	Grey
Viscosity @25 °C [77 °F] ^{a)}	143 cP
Density @25 °C [77 °F]	1.81 g/mL
Solids Percentage (wt/wt)	54%
Flash Point	None
Odor	Musty

a) Brookfield viscometer at 100 RPM with spindle LV S62

Properties of Cured 841WB

Electric Properties	Method	Value
Volume Resistivity	Method 5011.5 in MIL-STD-883H	<i>Resistance</i> ^{a)} 0.027 Ω·cm <i>Conductance</i> ^{a)} 37 S/cm
Surface Resistivity @2.8 mil Surface Resistance	Calculated	3.8 Ω/sq
1 coat @2.1mil 2 coat @2.7 mil 3 coat @4.1 mil	Square probe	1.4 Ω/sq 0.7 S 0.68 Ω/sq 1.5 S 0.39 Ω/sq 2.6 S
Magnetic Class Relative Permeability		Ferromagnetic (magnetic) ≥100

Table continued on the next page



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Burlington, Ontario, Canada QMI File # 004008

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841WB-Liquid

Electric Properties	Method	Value
Shielding Attenuation ^{b)} for 76 μm [3.0 mil]	IEEE STD 299-1997	
10 to 100 kHz	"	84 dB to 89 dB
>100 kHz to 1 MHz	"	55 dB to 87 dB
>1 MHz to 10 MHz	"	26 dB to 50 dB
>10 MHz to 100 MHz	"	19 dB to 39 dB
>100 MHz to 1 GHz	"	37 dB to 47 dB
>1 GHz to 10 GHz	"	36 dB to 47 dB
>10 GHz to 18 GHz	"	35 dB to 45 dB
Physical Properties	Method	Value
Paint Type	—	Aliphatic polyurethane (Thermoset)
Color	Visual	Grey
Abrasion Resistant	—	Yes
Blister Resistant	—	Yes
Peeling Resistant	—	Yes
Water and Salt Spray Resistant	—	Yes
Mechanical Properties	Method	Value
Adhesion on ABS	ASTM D3359	5B
Polycarbonate	"	5B
PVC	"	5B
Polyamide Nylon	"	5B
Fiber MG509	"	0B
Glass	"	0B
Aluminum	"	0B
Copper	"	0B
Stainless Steel	"	0B
Pencil Hardness on ABS	ASTM D3363	HB, hard
Environmental & Ageing Study	Method	Value
Salt Fog Test @35 °C [95 °F], 96 h ^{d)}	ASTM B117-2011	
Resistivity before	MG-ELEC-120	0.4 Ω/sq
Resistivity after	"	3 Ω/sq
% Conductivity after	"	10%
Cross-Hatch Adhesion (on ABS)	ASTM D3359-2009	0B
Cracking, unwashed area	ASTM D661-93	None
Visual Color, unwashed area	ASTM D1729-96	No change

Note: One coat thickness is typically around 51 μm [2 mil].

a) Surface resistance is given in Ω/sq and the corresponding conductance in Siemens (S or Ω⁻¹)

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.

The coating attenuation is plotted in Figure 1.

Shielding Attenuation

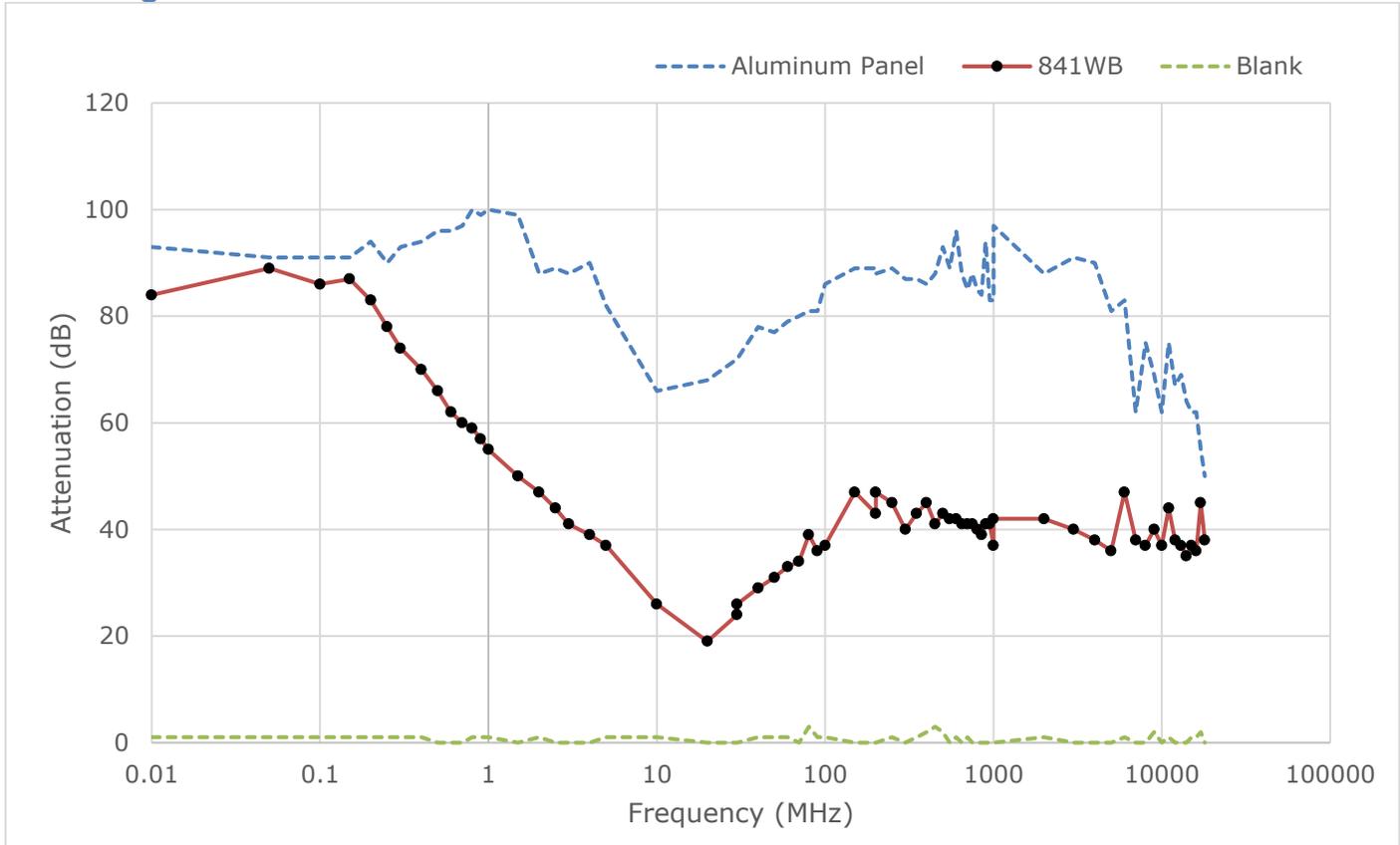


Figure 1. Attenuation of 841WB coating at different frequencies

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 resin is incompatible with common paint solvents like toluene, xylene, acetone, and MEK. Further, it will not withstand chronic exposures to engine oils, fuels and other similar hydrocarbons. While this makes the coating unsuitable for solvent rich environments, it does offer great repair and rework characteristics.

Adhesion—The 841WB coating adheres to typical drywall coatings including latex paints and other water based polyurethanes, and may be painted over with such paints as well.

Storage

Recommended storage between 16 to 27 °C [60 and 80 °F] in dry area. Do not store below -20 °C.

ATTENTION! If exposed to freezing temperatures during storage or transport, keep product at room temperature (22 ±3 °C) for at least 2 days prior to use. Ensure that the product is fully homogeneous by stirring after a day and immediately prior to use. If agglomeration is still present, wait an additional day before use.

Health, Safety, and Environmental Awareness

Please see the 841WB **Safety Data Sheet** (SDS) for greater details on transportation, storage, handling and other security guidelines.

Environmental Impact: The regulated VOC (Volatile Organic Compound) content is 145 g/L.

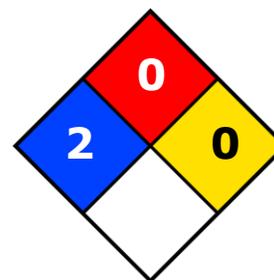
Health and Safety: The solvent system is mostly water, so the solvent system is quite safe.

Nickel can cause skin allergies and damage to lungs after long term exposure. IARC has classified nickel as a suspected carcinogen. Wear safety glasses or goggles and disposable gloves to avoid exposures. Do not ingest or inhale.

HMIS® RATING

HEALTH:	* 2
FLAMMABILITY:	0
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)

Application Instructions

The 841WB Super Shield can be easily applied by the paintbrush or spray gun.

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 2 mil [51 µm]. Follow the procedure below for ensure optimal conductivity.



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841WB-Liquid

Equipment and Supplies

- Mixing spatula
- Clean paint brush & an agitated paint container **OR** HPLV spray gun with agitator cup
- Water and cleaning rags
- Personal protection equipment (See 841WB-Liquid SDS)

Preparation

Clean and dry the surface of the substrate to remove oil, dust, water, solvents, and other contaminants.

To prepare 841WB mixture

- Mix thoroughly and pour into a clean, spray gun cup with agitator or a paint container with agitator.

WARNING! Do not attempt to use product that still shows sign of agglomeration due to freezing. See storage section for special instructions to be followed.

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 2 mil [51 µm].

Spray Equipment

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

Initial Setting Recommendations

Air Cap	#3 HVLP		
Pressure	<i>Inlet</i> 23 psi	<i>Air flow</i> 13.5 SCFM ^{a)}	<i>Air cap</i> 10 psi
Fluid Tip	1.3 mm [0.051"]	1.5 mm [0.059"] ^{b)}	

Note: These recommendations are based on a generic paint gun and may differ by brands. Please consult your spray gun manufacturer's guide.

a) SCFM = standard cubic foot per minute

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

To apply the coating

1. Mix paint thoroughly with a spatula or with mechanized paint mixer.
2. Spray a test pattern. This step ensures good flow quality and helps establish appropriate distance to avoid runs.
3. 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.
4. Wait 30 minutes and spray another coat.
5. Apply additional coats until desired thickness is achieved. (Go to Step 3)
6. Let dry at room temperature.

NOTE: Swirling the paint gun container slightly while waiting prevents settling.



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841WB-Liquid

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.

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 3 hours.

NOTE: Coats that are very thick require more time to dry.

Packaging and Supporting Products

<i>Cat. No.</i>	<i>Packaging</i>	<i>Net Volume</i>		<i>Net Weight</i>		<i>Packaging Weight</i>	
841WB-15ML	Jar	12 mL	0.4 fl oz	21.7 g	0.76 oz	TBD	TBD
841WB-150ML	Can	150 mL	5.0 fl oz	271 g	9.58 oz	"	"
841WB-850ML	Bottle	850 mL	1.79 pt	1.53 kg	3.39 lb	1.83 kg	4.03 lb
841WB-3.78L	Can	3.6 L	7.6 pt	6.51 kg	14.3 lb	7.51 kg	16.6 lb

Note: TBD = To be determined.

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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841WB-Liquid

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.

Disclaimer

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