



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

Super Shield™ Silver Coated Copper Epoxy Conductive Coating 843ER Technical Data Sheet

843ER

Description

The 843ER *Super Shield™ Silver Coated Copper Epoxy Conductive Coating* is a two-part system pigmented with highly conductive silver coated copper flake. It cures in 24 hours at room temperature or two hours at 80 °C. The cured coating is smooth and extremely hard. It is abrasion, scratch, and mar resistant. It also provides good chemical resistance and adheres strongly to plastics, including chemically resistant plastics.

Applications & Usages

This is a highly conductive coating for applications requiring extreme durability. It is suitable for use in military, automotive, aerospace, oil and gas applications, as well as on engines and aluminum flanges. It is an excellent choice in applications requiring a conductive coating with strong bonding to metal surfaces.

Benefits and Features

- Provides excellent EMI/RFI shielding across a broad range of frequencies
- Volume resistivity of 0.0018 Ω·cm
- Very strong adhesion to plastic, metal, and many other surfaces
- Extremely durable; vibration, abrasion, and impact resistant
- Will not scratch or flake
- Strong chemical resistance

Usage Parameters

<i>Properties</i>	<i>Value</i>
Working Life @22°C [72 °F]	8 h
Recoat Time @22°C [72 °F]	3 min
Cure Time @22 °C [72 °F]	24 h
Cure Time @80 °C [176 °F]	2 h
Shelf Life	1 y
Theoretical HVLP Spray Coverage ^{a)}	≤31 100 cm ² /L ≤3 m ² /L ≤18 200 in ² /gal ≤120 ft ² /gal

a) Idealized estimate based on a coat thickness of 50 µm [2.0 mil] and 65% transfer efficiency.

Temperature Ranges

<i>Properties</i>	<i>Value</i>
Constant Service Temperature	-40 to 120 °C [-40 to 248 °F]
Intermittent Temperature Limits	-60 to 130 °C [-76 to 266 °F]
Storage Temperature Limits ^{b)}	16 to 27 °C [60 to 80 °F]

b) The product must stay within the storage temperature limits stated.



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

Super Shield™ Silver Coated Copper Epoxy Conductive Coating 843ER Technical Data Sheet

843ER

Principal Components

Name	CAS Number
Part A: 2-Butanone	78-93-3
Silvered Copper	7440-22-4 + 7440-50-8
Bisphenol-A epoxy resin	25068-38-6
1-Butanol	71-36-3
Propan-2-ol	67-63-0
Part B: 2-Butanone	78-93-3
Polyamide Polymer	68410-23-1
Propan-2-ol	67-63-0
1-Butanol	71-36-3
Triethylenetetramine	112-24-3

Properties of Cured 843ER

<i>Physical Properties</i>	<i>Method</i>	<i>Value</i>
Color Resin Technology Conductive Filler Density @25 °C [77 °F]	Visual ASTM D 792	Metallic brown Epoxy Silver coated copper 1.0 g/mL
<i>Mechanical Properties</i>	<i>Method</i>	<i>Value</i>
Adhesion ^{a)} Pencil Hardness ^{a)}	ASTM D3359 ASTM D3363	5B 6H, hard
<i>Electric & Magnetic Properties</i>	<i>Method</i>	<i>Value</i>
Volume Resistivity @0.078" Surface Resistance ^{b)}	Method 5011.5 in MIL-STD-883H MG-ELEC-121	<i>Resistance</i> <i>Conductance</i> 1.80 x 10 ⁻³ Ω·cm 556 S/cm
1 coat @2 mil 2 coats @4 mil	" "	0.26 Ω/sq 3.8 S 0.19 Ω/sq 5.3 S
Magnetic class Relative Permeability Shielding Attenuation for 51 μm [2.0 mil]	IEEE STD 299-1997	Diamagnetic (Non-magnetic) <1.0
>10 to 100 kHz	"	84 dB to 89 dB
>100 kHz to 1 MHz	"	67 dB to 87 dB
>1 MHz to 10 MHz	"	42 dB to 62 dB
>10 MHz to 100 MHz	"	34 dB to 54 dB
>100 MHz to 1 GHz	"	54 dB to 65 dB
>1 GHz to 10 GHz	"	54 dB to 63 dB
>10 GHz to 18 GHz	"	43 dB to 64 dB



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

Super Shield™ Silver Coated Copper Epoxy Conductive Coating 843ER Technical Data Sheet

843ER

<i>Environmental & Ageing Study</i>	<i>Method</i>	<i>Value</i>
Salt Fog Test @35 °C [95 °F], 96 h ^{a)}	ASTM B117-2011	
Resistivity before	MG-ELEC-120	150 mΩ/sq
Resistivity after	"	730 mΩ/sq
% Conductivity after	"	20%
Cross-Hatch Adhesion	ASTM D3359-2009	0B
Cracking, unwashed area	ASTM D661-93	None
Visual Color, unwashed area	ASTM D1729-96	Discoloration, oxidized

Note: Properties measured on samples cured for 30 minutes at room temperature and 2 h at 80 °C.

a) Tested on acrylonitrile butadiene styrene (ABS) material.

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

The coating shielding attenuation is plotted in Figure 1.

Shielding Attenuation

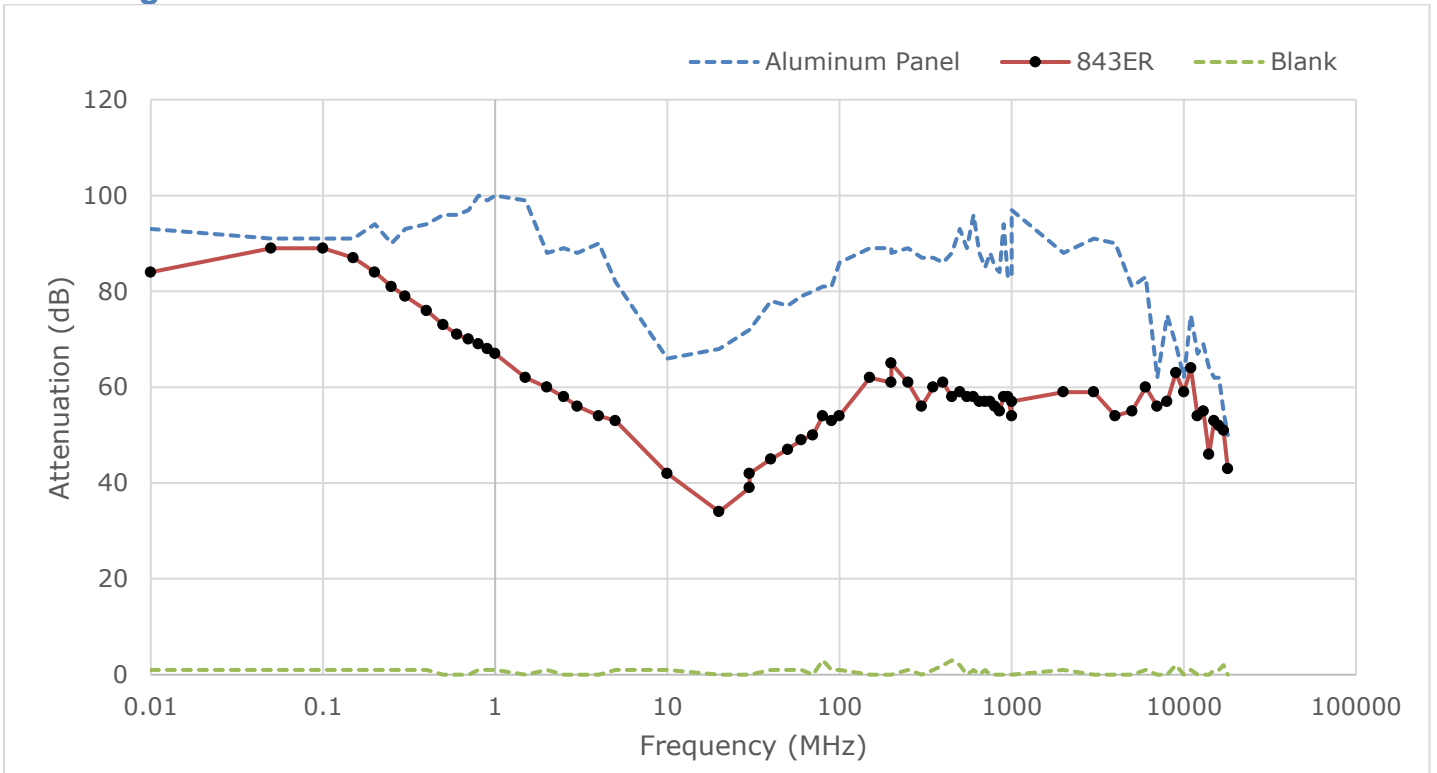


Figure 1. Attenuation of 843ER coating at different frequencies

Properties of Uncured 843ER

<i>Physical Property</i>	<i>Mixture</i>	
Color	Metallic brown	
Density	1.0 g/mL	
Mix Ratio by Weight (A:B)	100:28	
Mix Ratio by Volume (A:B)	100:36	
Solids Content (w/w)	30%	
<i>Physical Property</i>	<i>Part A</i>	<i>Part B</i>
Color	Metallic brown	Clear, amber
Viscosity ^{a)} @25°C [77 °F]	35 cP [0.035 Pa·s]	9.0 cP [0.009 Pa·s]
Density	1.2 g/mL	0.9 g/mL
Flash Point	≥-3 °C [≥26.6 °F]	≥-3 °C [≥26.6 °F]
Odor	Mild	Ammonia-like

a) Brookfield viscometer at 100 RPM with spindle LV S61

Compatibility

Chemical—Silver coated copper flakes are resistant to oxidation, except in environments that contain oxidizers, H₂S, or ozone, which tarnish their surface. Also avoid hydrochloric acid or other strong acids which can react with the metal filler.

Long term chemical exposure to solvents usually leads to negligible absorption and swelling, except in a few cases. For a few very aggressive organic solvents, the degree of softening and swelling can lead to fracturing.

ATTENTION! Perform a compatibility test in a representative environment prior to use to determine if other incompatibilities may be present.

Adhesion—The 843ER epoxy coating adheres to 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 printed circuit assembly with electronic cleaner such as MG Chemicals 4050 Safety Wash, 406B Superwash, or 824 Isopropyl Alcohol.

Storage

Store between 16 and 27 °C [60 and 80 °F] in dry area away from sunlight.

Health, Safety, and Environmental Awareness

Please see the 843ER **Safety Data Sheet** (SDS) parts A and B for more details on transportation, storage, handling and other security guidelines.

Environmental Impact: The calculated VOC (Volatile Organic Compound) content is 52% (627 g/L) for part A and 67% (573 g/L) part B. The calculated VOC (Volatile Organic Compound) of the mixture is 76% [779 g/L]. Reactive components become part of the solid epoxy; therefore, they are no-longer VOCs in their final form.

Health and Safety: Both 843ER parts, A and B, are classified as highly flammable liquid and vapor.

Wear safety glasses or goggles and disposable polyvinyl chloride, neoprene, or nitrile gloves while handling liquids. Part A & B can cause eye damage and skin irritation. Skin sensitization may occur after repeated or prolonged exposures.

Inhalation can cause dizziness or drowsiness. Use in well-ventilated area or outdoors.

Wash hands thoroughly after use or if skin contact occurs. Do not ingest. Avoid breathing vapors, mist, or spray.

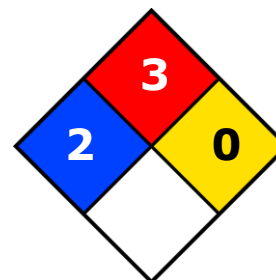
The cured coating—in a non-dust form—presents no classifiable hazard.

Part A

HMIS® RATING

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

NFPA® 704 CODES

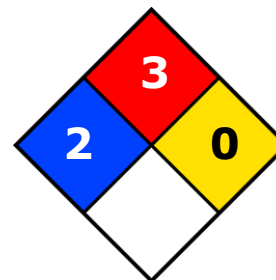


Part B

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)



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

Super Shield™ Silver Coated Copper Epoxy Conductive Coating 843ER Technical Data Sheet

843ER

Application Instructions

Follow the procedure below for best results. If you have little or no experience with the 843ER epoxy coating, please follow the long instructions instead. The short instructions provided here are not suitable for first time users.

Equipment and Supplies

- Mixing spatulas and mixing container
- Clean paint brush **OR** HVLP spray gun with agitator cup **OR** dip tank system
- Thinner/Cleaner solvent (for cleaning brush, spray gun, or spills)
- Personal protection equipment (See 843ER-2 parts SDS)

Preparation

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

To prepare 100:28 (A:B) epoxy mixture

- Scrape any settled material in the **Part A** container, and stir until homogenous.
- Scrape any settled material in the **Part B** container, and stir until homogenous.
- Weigh a desired amount of pre-stirred **A** into a mixing container.
- Multiply the measured weight of **A** by **0.28** and add this amount of pre-stirred **B** to the mixing container.
- Mix thoroughly and pour into a clean, spray gun cup with agitator.

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) spray gun and 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.



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

Super Shield™ Silver Coated Copper Epoxy Conductive Coating 843ER Technical Data Sheet

843ER

To apply the coating

1. Spray a test pattern. This step ensures good flow quality and helps establish appropriate distance to avoid runs.
2. 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.
3. Wait 3 minutes and spray another coat. The delay avoids trapping solvent between coats.
4. Apply additional coats until desired thickness is achieved. Go back to Step 3.
5. Let dry for 5 minutes (flash off time) at room temperature.

To room temperature cure the 843ER epoxy

Let stand for 24 hours.

To heat cure the 843ER epoxy

Put in oven at 80 °C [176 °F] for 2 hours.

TIP! If you don't have an agitator in your spray gun, swirling the paint gun container while waiting prevents settling.

ATTENTION!

- Coats that are applied too thick cause runs and hampers solvent evaporation. Apply many thin wet coats rather than a single thick coat.
- Spraying onto horizontal surfaces is not recommended due to possible uneven settling of metallic filler.

Packaging and Supporting Products

<i>Cat. No.</i>	<i>Packaging</i>	<i>Net Volume</i>		<i>Net Weight</i>		<i>Packaging Weight</i>	
843ER-800ML	Can	810 mL	1.71 pt	895 g	1.97 lb	1.7 kg	3.7 lb
843ER-3.25L	Can	3.25 L	6.87 pt	3.59 kg	7.92 lb	4.5 kg	9.9 lb

Thinners & Conductive Coating Removers

- *Thinner*: Cat. No. 435-1L, 435-4L
- *Thinner 1*: Cat. No. 4351-1L, 4351-4L



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

Super Shield™

Silver Coated Copper Epoxy Conductive Coating

843ER Technical Data Sheet

843ER

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.

Email: support@mgchemicals.com

Phone: +(1) 800-340-0772 (Canada, Mexico & USA)

+ (1) 905-331-1396 (International)

Fax: +(1) 905-331-2862 or +(1) 800-340-0773

Mailing address: **Manufacturing & Support**
1210 Corporate Drive
Burlington, Ontario, Canada
L7L 5R6

Head Office
9347-193rd Street
Surrey, British Columbia, Canada
V4N 4E7

Warranty

M.G. Chemicals Ltd. warranties 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

This information is believed to be accurate. It is intended for professional end users having the skills to evaluate and use the data properly. *M.G. Chemicals Ltd.* does not guarantee the accuracy of the data and assumes no liability in connection with damages incurred while using it.