



Super Shield™ Graphite Conductive Coating 839 Technical Data Sheet

Description

The 839 *Graphite Conductive Coating* is an economical acrylic paint that uses a graphite filler to create conductive, static free surfaces. This electro-conductive, antistatic material also reduces electromagnetic or radio frequency interference (EMI/RFI). The durable acrylic resin affords long-term protection that minimizes loss of graphite through rubbing. The cured coat withstands large temperature changes and marine environmental conditions without cracking, which makes it suitable for a wide range of application.

Applications & Usages

Its primary application is as a general use conductor to provide low cost EMI/RFI shielding or conductive base for some electroplating process. It can be used anywhere in a manufacturing process where it is necessary to impart conductivity to a surface. It works well on drywall, and can be used to shield entire rooms.

Benefits and Features

- **High Conductivity—Low Surface resistivity** of 47 Ω/sq for one coat (1 mil)
- **Tough and durable coating, salt spray tested with excellent weatherability**
- **Repairable and removable thermoplastic paint system**
- **Stronger adhesion than water based coatings**
- **Corrosion-proof coat**—slows or prevents substrate oxidation
- **Rub off resistant**

ENVIRONMENT
Meets RoHS directive

Curing & Work Schedule

<i>Properties</i>	<i>Value</i>
Dry to Touch (Liquid) ^{a)}	3 to 5 min
Recoat time (Liquid) ^{a)}	5 min
Full Cure @room temp.	24 h
Full Cure @65 °C	30 min
Shelf Life	3 y
Storage Temperature Limits ^{b)}	-5 to +40 °C [+23 to +104°F]

a) Assumes let 1:1 let down with MG 435 Thinner Cleaner Solvent

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

Service Ranges

<i>Properties</i>	<i>Value</i>
Service Temperature	-40 to +120 °C [-40 to +248 °F]
Maximum Coverage Per Liter ^{c)}	<90 000 cm ² [<97 ft ²]
Maximum Coverage Per Gallon ^{c)}	<378 000 cm ² [<406 ft ²]

c) Idealized coverage based on a coat thickness of 25 μm [1.0 mil] and 65% transfer efficiency.

Principal Components

Name	CAS Number
Graphite	7782-42-5
Carbon Black	1333-86-4
Acrylic Resin	9003-01-4
Acetone	67-64-1
Ethanol	64-17-5
Toluene	108-88-3

Properties of Cured 839

<i>Electric Properties</i>	<i>Method</i>	<i>Value</i>
Surface Resistance		<i>Resistance</i> ^{a)} <i>Conductance</i> ^{a)}
: 1 × coat @ 1.0 mil	Square probe	47 Ω/sq 0.021 S
: 2 × coats @ 2.0 mil	Square probe	28 Ω/sq 0.036 S
: 3 × coats @ 3.0 mil	Square probe	16 Ω/sq 0.063 S
: 4 × coats @ 4.0 mil	Square probe	13 Ω/sq 0.077 S
<i>Physical Properties</i>	<i>Method</i>	<i>Value</i>
Color	Visual	Black
Paint type	—	Lacquer (thermoplastic)
Abrasion resistant	—	Yes
Blister resistant	—	Yes
Peeling resistant	—	Yes
<i>Environmental & Ageing Study</i> ^{a)}	<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	Unchanged
Peeling, unwashed area	ASTM D1729-96	None

Note: The first coat thickness is typically around 25 μm [1 mil].

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

Surface Resistance by Coating Thickness

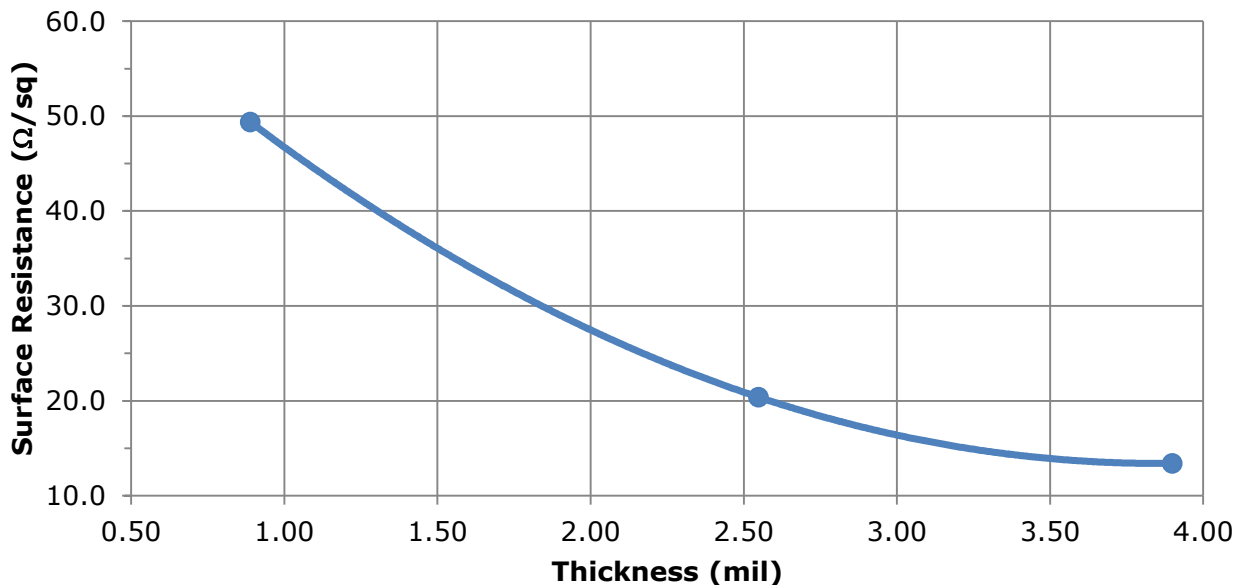


Figure 1. Graphite conductive coating surface resistance for different thicknesses (the dots indicate typical successive coat thicknesses)

Properties of Uncured 839

<i>Physical Property</i>	<i>Mixture</i>
Color	Black
Density @25 °C	0.996 g/mL
Solids Percentage (wt/wt) ^{a)}	~39%
Viscosity at 25 °C [77 °F] ^{b)}	9500 cP
Let down ratio (Paint:Solvent)	1:1
Flash Point	-16 °C [3.2 °F]
Odor	Ethereal

a) Percentage for liquid only (before thinning)

b) Brookfield viscometer at 50 RPM with spindle LV4



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839-Liquid

Compatibility

Adhesion—The 839 coating adheres to most paints, plastics, and fiber surfaces; 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.

839 Adherence Compatibility

<i>Substrate</i>	<i>Note</i>
Acrylonitrile Butadiene Styrene (ABS)	Chemically etches ^a and adheres well to this substrate.
Polybutylene Terephthalate (PBT)	"
Polycarbonate	"
Polyvinyl Acetate (PVA)	"
Acrylics or acrylic paints	Adheres well to clean surface
Polyurethane	Adheres well to clean surface for most urethane types
Wood	Adheres well with surface preparation (use of a primer is suggested)

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! Do not use on thin plastics or on plastics where you want to keep original surface intact. The 839 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. Using the 4351-1L thinner lessens the etching effects for chemically sensitive substrates.

Storage

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

Health, Safety, and Environmental Awareness

Please see the 839 **Material Safety Data Sheet** (MSDS) for greater details on transportation, storage, handling and other security guidelines.

Environmental Impact: The volatile organic content is 39% (517 g/L) by EPA and WHMIS standards. After dilution with 435 Thinner Cleaner, the regulated VOC drops to 31% (~320 g/L).

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

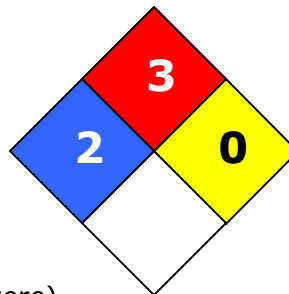
Health and Safety: The solvents in 839 can ignite if exposed to flames or sparks and can cause respiratory track irritation. If ignited, then flame flash back is possible. Use in well-ventilated area.

Solvents can cause skin irritation and have some reproductive effects. Wear safety glasses or goggles and disposable gloves to avoid exposures.

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)

Application Instructions

The 839 Graphite Conductive Coating can be easily applied by the paintbrush, spray gun, or dip method.

For best results, apply thin wet coats as opposed to using thick coats. We recommend a final dry film thickness of at least 1.0 mil [25 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

Material & Equipment

- Mixing spatula
- Clean paint brush **OR** HVLP spray gun **OR** dip tank system
- Thinner/Cleaner solvent
- Personal protection equipment (See 839-Liquid MSDS)



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839-Liquid

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 HVLP (high-volume low pressure) spray gun 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	<i>Air cap</i> 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.



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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

<i>Cat. No.</i>	<i>Form</i>	<i>Net Volume</i>		<i>Net Weight</i>		<i>Shipping Weight</i>	
839-900ML	Liquid	0.9 L	0.24 gal	0.9 kg	2.0 lb	1.8 kg	4 lb
839-1G	Liquid	3.8 L	1.0 gal	3.8 kg	8.3 lb	7 kg	15 lb

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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