

Description

Our 419D *Overcoat Pen* are solder resist coatings that are a fast drying, xylene and toluene free. The pen provides an excellent finish in multiple colors. They are ideal for high moisture environments and applications requiring easy repair and rework.

Applications & Usages

The 419D pen protect area of a printed circuit board from taking solder, helping confine solder to intended areas only. This prevents formation of unintentional solder bridges, which could cause short circuits. It also protects electric circuits against moisture, dirt, dust, thermal shocks, and scratches that could corrode, or otherwise damage the electric components. It insulates against high-voltage arcing, shorts, and static discharges.

The 419D pen improves reliability, operational range, and lengthens the life of electrical and electronic components and assemblies. Its primary applications are in the automobile, marine, aerospace, aviation, communication, instrumentation, industrial control equipment, and consumer electronics industries.

Benefits and Features

- **Clear Overcoat Pen** (Cat No. 419D-P-CL) **is certified to UL 94-V0 and IPC-CC-830B**
- **No Hazardous Air Pollutants**—free of toluene or xylene
- **Excellent finish**—smooth, homogeneous, and durable
- **Protects electronics from** moisture, corrosion, fungus, and static discharges
- **Easy rework and repairs**—removable with Cat. No. 435, 4352 thinner or 8310 stripper
- **Comes in variety of colors**—blue, black, clear, green, and white

Usage Parameters ^{a), b)}

<i>Properties</i>	<i>Value</i>
Tack Free	10 to 15 min
Recoat time	2 to 3 min
Full Cure @room temperature	24 h
Full Cure @65 °C [149 °F]	60 min
Shelf Life	3 y

- a) Values based on the 419D without colorants
b) Assumes let 1:1 let down with MG 4352 Thinner 2

Temperature Ranges

<i>Properties</i>	<i>Value</i>
Constant Service Temperature	-65 to 125 °C [-85 to 257 °F]
Storage Temperature Limits ^{c)}	-5 to 40 °C [23 to 104 °F]

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

Properties of Cured 419D without colorants

<i>Physical Properties</i>	<i>Method</i>	<i>Value</i>
Color	Visual	Crystal Clear
Solderability	—	Excellent
Weather Resistance	—	Excellent
Fungus Resistance	IPC-TM-650 2.6.1.1	Pass
Flexibility	IPC-TM-650 2.4.5.1	Pass
Flammability	UL registered <u>E203094</u>	94V-0
<i>Electric Properties</i>	<i>Method</i>	<i>Value</i>
Dielectric Withstand Voltage	per IPC-TM-650	>1500 V
Insulation Resistance (after 24 h)	IPC-TM-650 Test 2.6.3.4	$1 \times 10^{12} \Omega$

Note: See Appendix A for UL 94V-0 and IPC-CC-830B standards test results based on the clear Overcoat Pen (Cat No. 419D-P-CL).

Properties of Uncured 419D without colorants

<i>Physical Property</i>	<i>Method</i>	<i>Value</i>
Odor	—	Slight
Viscosity @23 °C [73 °F]	Brookfield SP1	100 cP [0.10 Pa·s]
Density	ASTM D 1475	0.92 g/mL
Flash Point	Closed Cup	-3 °C [26 °F]
Boiling Point	—	≥80 °C [≥176 °F]
Solids Content (w/w)	—	29.5%

Compatibility

The 419D pen is compatible with most materials found on printed circuit assemblies; however, in an uncured state it is not compatible with contaminants like water, oil, and greasy flux residues. Therefore, it is extremely important to clean the printed circuit assembly thoroughly with a suitable electronic cleaner before applying the coating.

The chosen electronic cleaner should remove moisture, wax, greases, oils, and all other contaminants that are known to cause defects in this type of conformal coating. (See recommended cleaners on page 3.)

Health, Safety, and Environmental Awareness

Please see the 419D-Pen **Safety Data Sheet** (SDS) for more details on transportation, storage, handling and other security guidelines.

Environmental Impact: The volatile organic content is 53% (437 g/L) by EPA and WHMIS standards.



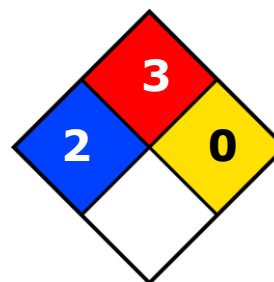
This product meets the European Directive 2011/65/EU Annex II (ROHS); recasting 2002/95/EC.

Health and Safety: The pen is flammable and should be kept away from flames and other ignition sources. As with most paint materials, avoid breathing in fumes or direct contact with the material. Solvents therein can cause irritation and other symptoms like headaches, pain, as well as having long term exposure effects.

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)

Wear safety glasses and disposable gloves. Wash hands thoroughly after use. Use in the open air, in fume hoods, or in well ventilated area. For short or long term (8 hours) at levels of exposures exceeding of 150 ppm butyl acetate or 200 ppm MEK, use NIOSH approved respirator with organic vapor cartridges rated for this order of concentrations.

The cured coating presents no known hazard.

Pen Application Instructions

Follow the procedure below for best results.

To apply the liquid pen

1. Ensure that the surface to be coated is clean and oil-free.
2. Shake the pen vigorously. Ensure that you hear the clicking of the mixing bearing hitting both ends of the barrel.
3. Test on a blank to ensure good flow quality and uniformity during application.
4. Touch the pen lightly on the surface while squeezing the barrel to apply thin and even coat.
5. Let dry for 3-5 minutes (flash off time) at room temperature before handling.

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 60 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>Color</i>	<i>Packaging</i>	<i>Net Volume</i>		<i>Net Weight</i>		<i>Packaging Weight</i>	
419D-P-BK	Black	Pen	5 mL	0.17 fl oz	4.6 g	0.14 oz	25 g	0.8 oz
419D-P-BL	Blue	Pen	5 mL	0.17 fl oz	4.6 g	0.14 oz	25 g	0.8 oz
419D-P-CL	Clear	Pen	5 mL	0.17 fl oz	4.6 g	0.14 oz	25 g	0.8 oz
419D-P-GR	Green	Pen	5 mL	0.17 fl oz	4.6 g	0.14 oz	25 g	0.8 oz
419D-P-WH	White	Pen	5 mL	0.17 fl oz	4.6 g	0.14 oz	25 g	0.8 oz

Thinners & Conformal Coating Removers

- *Thinner 2:* Cat. No. 4352-945ML, 4352-4L (1 gal), 4352-20L, 4352-200L
- *Conformal Coating Stripper:* Cat. No. 8310-100ML

Electronic Cleaners

- *Safety Wash Electronics Cleaner:* Cat. No. 4050A-340G, 4050-1L, 4050-4L, 4050-20L
- *Superwash Cleaner Degreaser:* Cat. No. 406B-450G
- *Isopropyl Alcohol:* Cat. No. 824



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

419D Overcoat Pen Technical Data Sheet

419D-Pen

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.

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.

Appendix A

Standards Qualification

The clear Overcoat Pen (Cat No. 419D-P-CL) was certified UL 94V-0 and IPC-CC-830B qualified. The colorants were not tested, but they are expected to be insulating and non-flammable.

<i>Qualification Criteria</i>	<i>Test Method</i>	<i>Results</i>
UL 94V-0		
Coating flammability	UL 94V (File # E203094)	94V-0
Qualified IPC-CC-830B ^{a)}		
Appearance	IPC-CC-830B 3.5.2	Pass
Fluorescence	IPC-CC-830B 3.5.3	Pass
Flammability	IPC-CC-830B 3.5.6	Pass
Fungus Resistance	IPC-TM-650 2.6.1.1	Pass
Flexibility	IPC-TM-650 2.4.5.1	Pass
Dielectric Withstand Voltage	IPC-TM-650 2.5.7.1	Pass
Moisture and Insulation Resistance	IPC-TM-650 2.6.3.4	Pass
Thermal Shock	IPC-TM-650 2.6.7.1	Pass
Temperature Humidity Aging (Optional)	IPC-TM-650 2.6.11.1	Pass

Note: All tests passed; this product thus meets the full IPC-CC-830B Class B requirements.

a) Qualified independently by Pacific Testing Laboratories, Inc.