

Acrylic Conformal Coating

Description

419D is a one-part, acrylic conformal coating that cures to a durable, flexible and smooth finish. It is easy to apply and can be handled in 10 minutes. It may be removed with appropriate strippers or soldered through for repair or rework.

419D creates a robust moisture barrier that protects printed circuit boards in humid environments. It strongly protects against moisture, corrosion, fungus, dirt, dust, thermal shock, short circuits, high-voltage arcing, and static discharge.

Features and Benefits

- Certified UL 94 V-0 (File# [E203094](#))
- Qualified to IPC-CC-830B by Pacific Testing Laboratories
- Xylene and toluene free
- Fluoresces under UV-A light (blacklight)
- Validated for selective robotic coating equipment including PVA and Nordson ASYMTEK

Usage Parameters

Properties	Value
Drying time to handle	10–15 min
Tack free	TBD
Recoat time	2–3 min
Full cure @22 °C [72 °F]	24 h
Full cure @65 °C [149 °F]	1 h
Full cure @80 °C [176 °F]	20 min
Full cure @100 °C [212 °F]	10 min
Full cure @120 °C [248 °F]	5 min
Shelf life	5 y
Theoretical coverage per litre ^{a)}	≤61 000 cm ² [≤9 400 in ²]
Theoretical coverage per US gallon ^{a)}	≤231 000 cm ² [≤35 000 in ²]

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

Temperature Ranges

Properties	Value
Constant service temperature	-65 to 125 °C [-85 to 257 °F]
Storage temperature limits	-5 to 40 °C [23 to 104 °F]

Cured Properties

Physical Properties	Method	Value
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 E203094	94 V-0
Electrical Properties	Method	Value
Resistivity	ASTM D 257	$4.6 \times 10^{14} \Omega \cdot \text{cm}$
Breakdown voltage @0.7 mil	ASTM D 149	700 V [0.7 kV]
Dielectric strength @0.7 mil	ASTM D 149	1 000 V/mil [0.04 kV/mm]
Dielectric withstand voltage	per IPC-TM-650	>1 500 V [>1.5 kV]
Insulation resistance (after 24 h)	IPC-TM-650 Test 2.6.3.4	$1 \times 10^{12} \Omega$
Dielectric constant @60 Hz @1 MHz	ASTM D 150-11 ASTM D 150-11	1.66 2.85
Dissipation factor @60 Hz @1 MHz	ASTM D 150-11 ASTM D 150-11	0.19 0.004

NOTE: See Appendix A for UL 94 V-0 and IPC-CC-830B standards test results.

Cured Properties

Thermal Properties	Method	Value
Glass transition temperature (T _g)	ASTM E 831	44 °C [111 °F]
CTE ^{a)} prior T _g	ASTM E 831	72 ppm/°C [162 ppm/°F]
Mechanical Properties	Method	Value
Adhesion (ABS)	ASTM D 3359	5B
(PC)	ASTM D 3359	5B
(PVC)	ASTM D 3359	5B
(Polyamide)	ASTM D 3359	4B
(Glass)	ASTM D 3359	0B
(Copper)	ASTM D 3359	0B
(Aluminum)	ASTM D 3359	0B
(FR4)	ASTM D 3359	0B
Pencil hardness (ABS)	ASTM D 3363	HB, soft

NOTE: See Appendix A for UL 94 V-0 and IPC-CC-830B standards test results.

a) Coefficient of Thermal Expansion (CTE) units are in ppm/°C = in/in/°C × 10⁻⁶ = unit/unit/°C × 10⁻⁶.

Uncured Properties

Physical Properties	Method	Value
Odor	—	Ester-like, fruity
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)	—	30%

Compatibility

The 419D adheres to most plastics and metals used to house printed circuit assemblies; however, it is not compatible with contaminants like water, oil, or greasy flux residues that may affect adhesion. If contamination is present, first clean the surface to be coated with MG Chemicals 824 Isopropyl alcohol.

Attention!

Do not use on thin plastics or plastics where you want to keep original surface. The product contains a controlled amount of solvents designed to chemically etch plastic surfaces to help adhesion.

Storage

Store between -10 and 40 °C [14 and 104 °F] in a dry area, away from sunlight.

Health and Safety

Please see the 419D-Liquid Safety Data Sheet (SDS) for further details on transportation, storage, handling, safety guidelines, and regulatory compliance.

Application Instructions

Spray Equipment

The spray gun recommendations below are based on generic paint guns and may vary by brands. Consult your spray gun manufacturer's guide.

Initial Setting Recommendations

Air Cap	HVLP (high volume, low pressure) or LVMP (low volume, medium pressure)		
Pressure	Inlet: 23 psi	Air flow: 13.5 SCFM ^{a)}	Air cap: 10-15 psi
Fluid Tip	0.8–1.3 mm		

a) Standard cubic foot per minute

Spraying:

1. Dilute coating with 4352 Thinner 2. Adjust ratio if required.
2. Stir the coating gently but thoroughly.
3. Spray a test pattern to ensure good flow quality.
4. At an approximate distance of 20–25 cm (8–10 in), tilt the board 45° from a vertical position and spray a thin and even coat. 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 2–3 min before applying another coat to avoid trapping solvent.
6. Rotate the board 90° and spray again to ensure good coverage.
7. Apply other coats until desired thickness is achieved (go to step 3).
8. Let dry for 2–3 min at room temperature before heat cure.

Touch up by brushing:

1. Stir the coating gently but thoroughly.
2. Use a brush apply a small amount to touch up.

Dip coating:

Use a Ford or Zahn cup to monitor the viscosity of the coating as the solvent will evaporate over time.

1. Hang the PCB on a dipping arm.
2. Slowly lower the PCB into a tank and leave immersed in the coating for 2 min to allow penetration.
3. Slowly withdraw the PCB from the tank at an approximate rate of 6"/min.
4. Let dry for 2-3 min before applying additional coats or heat cure.

Selective coating:

Custom blended solutions are available and have been verified for use with selective coating machines using both non-atomised and film coating applicators. To inquire about a custom solution tailored to your equipment, contact MG Chemicals' Technical Support for assistance.

Cure Instructions

Room temperature cure:

- Let cure at room temperature for 24 h.

Heat cure:

- Put in oven at 65 °C [149 °F] for 1 h.
—OR—
- Put in oven at 80 °C [176 °F] for 20 min.
—OR—
- Put in oven at 100 °C [212 °F] for 10 min.
—OR—
- Put in oven at 120 °C [248 °F] for 5 min.

Packaging and Supporting Products

Cat. No.	Packaging	Net Volume	Net Weight	Packaged Weight
419D-55ML	Bottle	55 mL [1.86 fl oz]	50.6 g [1.78 oz]	140 g [0.31 lb]
419D-1L	Can	945 mL [1.99 pt]	869 g [1.91 lb]	1.00 kg [2.24 lb] ^{a)}
419D-4L	Can	3.78 L [1.00 gal]	3.47 kg [7.66 lb]	4.5 kg [10 lb]
419D-20L	Can	18.9 L [5.04 gal]	17.3 kg [38.3 lb]	20 kg [44 lb]
419D-340G	Aerosol	410 mL [13.8 fl oz]	340 g [11.9 oz]	340 g [0.75 lb]

a) Case pack of 5

Technical Support

Please contact us regarding any questions, suggestions for improvements, or problems with this product. Application notes, instructions and FAQs are located at www.mgchemicals.com.

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Disclaimer

This information is believed to be accurate. It is intended for professional end users who have the skills required 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

Certified UL 94 V-0 and IPC-CC-830B qualified.

UL 94 V-0

Qualification Criteria	Test Method	Results
Coating flammability	UL 94 V (File # E203094)	94 V-0

Qualified IPC-CC-830B

Qualification Criteria	Test Method	Results
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: Qualified independently by Pacific Testing Laboratories, Inc.