

Premium Polyurethane Conformal Coating

Description

4223D is a one-part, heat curing, thermoset polyurethane conformal coating that cures to a durable, flexible, scratch resistant and smooth finish. It is easy to apply and can be handled in as little as 15 minutes. It cures in only 2 hours at 100 °C (212 °F). It may be removed with appropriate strippers, or soldered through for repair or rework.

4223D protects printed circuit boards in chemically challenging environments. It provides strong protection against aggressive chemicals, corrosion, moisture, fungus, dirt, dust, thermal shock, abrasion, short circuit, 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
- Excellent corrosion resistance—tested in both salt spray and hydrogen sulfide environments with little signs of oxidation or tarnish buildup
- Fluoresces under UV-A light (blacklight)
- Isocyanate-free
- Validated for selective robotic coating equipment including PVA and Nordson ASYMTEK

Usage Parameters

Properties	Value
Tack free	10–15 min
Recoat time	2–3 min
Full cure @80 °C [176 °F]	18 h
Shelf life	3 y
Theoretical coverage per liter ^{a)}	≤109 000 cm ² [≤16 000 in ²]
Theoretical coverage per US gallon ^{a)}	≤412 000 cm ² [≤63 000 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	Clear, amber tint
Solderability	—	Good
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
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	$9 \times 10^{12} \Omega$
Thermal Properties	Method	Value
Glass transition temperature (T_g)	Optical Dilatometry	57 °C [135 °F]
CTE ^{a)} prior T_g after T_g	Optical Dilatometry	127 ppm/°C [260 ppm/°F] 186 ppm/°C [367 ppm/°F]

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	—	Mild, pungent
Viscosity @25 °C [77 °F]	Brookfield SP1	330 cP [0.330 Pa·s]
Density	ASTM D 1475	0.97 g/mL
Flash point	Closed cup	-3 °C [26 °F]
Boiling point	—	≥80 °C [≥176 °F]
Solids content (w/w)	—	45%

Compatibility

The 4223D 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 4223D-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. Stir the coating gently but thoroughly.
2. Spray a test pattern to ensure good flow quality.
3. 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.
4. Wait 2–3 min before applying another coat to avoid trapping solvent.
5. Rotate the board 90° and spray again to ensure good coverage.
6. Apply other coats until desired thickness is achieved (go to step 3).
7. 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 to tack free finish 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:

Do NOT cure at room temperature. This product will only cure at elevated temperatures.

Heat cure:

- Put in oven at 80 °C [176 °F] for 18 h.

Packaging and Supporting Products

Cat. No.	Packaging	Net Volume	Net Weight	Packaged Weight
4223D-1L	Can	945 mL [1.99 pt]	894 g [1.97 lb]	1.10 kg [2.43 lb]
4223D-4L	Can	3.78 L [1.00 gal]	3.57 kg [7.89 lb]	4.20 kg [9.26 lb]
4223D-20L	Pail	18.9 L [5.04 gal]	17.8 kg [39.4 lb]	18.0 kg [39.6 lb]

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: The optional humidity aging test failed due to a late stage loss of clarity that prevented color codes and identification marking to be viewed. This product meets only the IPC-CC-830B Class A requirements. Qualified independently by Pacific Testing Laboratories, Inc.