

Premium Polyurethane Conformal Coating

Description

4223F is a one-part, heat curing, UL 746E certified, thermoset polyurethane conformal coating. It cures to a durable, flexible, scratch resistant, and smooth finish. It is easy to apply and can be handled in 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.

4223F 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 746E (File# [E203094](#)) for outdoor use
- 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
- Xylene free
- Fluoresces under UV-A light (blacklight)
- Isocyanate-free
- Suitable for use with robotic coating equipment

Usage Parameters

Properties	Value
Drying time to handle	15 min
Recoat time	3 min
Full cure @80 °C [176 °F]	16 h
Full cure @100 °C [212 °F]	2 h
Shelf life	3 y
Theoretical coverage per 312 g can ^{a)}	≤14 000 cm ² [≤2 200 in ²]

a) Estimate based on a coat thickness of 25 µm [1.0 mil] and 50% transfer efficiency.

Temperature Ranges

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

Cured Properties

Physical Properties	Method	Value
Color	Visual	Clear, amber tint
Solderability	—	Good
Chemical resistance	—	Excellent
Weather resistance	—	Excellent
Fungus resistance	IPC-TM-650 2.6.1.1	Passed
Flexibility	IPC-TM-650 2.4.5.1	Passed
Flammability	Similar to file # E203094	94 V-0
Glass transition temperature (T_g)	Optical dilatometer	57 °C [135 °F]
CTE prior T_g	Optical dilatometer	130 ppm/°C [266 ppm/°F]
CTE after T_g	Optical dilatometer	190 ppm/°C [374 ppm/°F]
UV inspection absorption max	Absorption spectrum	375 nm (near UV)
UV inspection fluorescence max	Emission spectrum	437 nm (blue)

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

Cured Properties

Electrical Properties	Method	Value
Volume resistivity	ASTM D 257	$3.5 \times 10^{13} \Omega \cdot \text{cm}$
Breakdown voltage @1.2 mil	ASTM D 149	1 200 V [1.2 kV]
Dielectric strength @1.2 mil	ASTM D 149	1 000 V/mil [0.04 kV/mm]
Dielectric withstand voltage	IPC-TM-650 Test 2.5.7.2	>1 500 V [>1.5 kV]
Insulation resistance (after 24 h)	IPC-TM-650 Test 2.6.3.4	$9 \times 10^{12} \Omega$
Dielectric constant @60 Hz @1 MHz	ASTM D 150-11 ASTM D 150-11	1.83 0.29
Dissipation factor @60 Hz @1 MHz	ASTM D 150-11 ASTM D 150-11	2.86 0.009
Mechanical Properties	Method	Value
Adhesion (ABS)	ASTM D 3359	0B
(PC)	ASTM D 3359	TBD
(PVC)	ASTM D 3359	0B
(Polyamide)	ASTM D 3359	5B
(Glass)	ASTM D 3359	5B
(Copper)	ASTM D 3359	5B
(Aluminum)	ASTM D 3359	5B
(FR4)	ASTM D 3359	5B
Pencil hardness (ABS)	ASTM D 3363	HB, soft

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

Uncured Properties

Physical Properties	Method	Value
Odor	—	Mild petroleum
Viscosity @25 °C [77 °F]	Brookfield SP1	330 cP [0.330 Pa·s]
Density	ASTM D 1475	0.80 g/mL
Flash point	Closed cup	-104 °C [-155 °F]
Boiling point	—	80 °C [176 °F]
Solids content (w/w)	Calculated	45%

Compatibility

The 4223F 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 -5 to 40 °C [23 to 104 °F] in a dry area, away from sunlight.

Health and Safety

Please see the 4223F-Aerosol Safety Data Sheet (SDS) for further details on transportation, storage, handling, safety guidelines, and regulatory compliance.

Application Instructions

Spraying:

1. Shake the can vigorously.
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 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 3 min at room temperature before heat cure.

Clearing nozzle between use:

1. Invert the can upside down.
2. Hold button until clear propellant comes out. The propellant should clear in seconds.

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 16 h.
—OR—
- Put in oven at 100 °C [212 °F] for 2 h.

Packaging and Supporting Products

Cat. No.	Packaging	Net Volume	Net Weight	Packaged Weight
4223F-312G	Aerosol	430 mL [14.6 fl oz]	312 g [11.0 oz]	Not available
4223F-1L	Can	945 mL [1.99 pt]	841 g [1.85 lb]	1.10 kg [2.43 lb]
4223F-4L	Can	3.78 L [3.99 qt]	3.36 kg [7.42 lb]	Not available
4223F-20L	Pail	18.9 L [4.99 gal]	16.8 kg [37.1 lb]	Not available

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

Meets UL 94 V-0 and IPC-CC-830B (August 2002).

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	Fail

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 the 2002 IPC-CC-830B Class A requirements. Qualified independently by Pacific Testing Laboratories, Inc.

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