

Description

Our 4223F Polyurethane Conformal Coating is a heat curing, one part product that provides an excellent scratch, chemical resistant finish, meets UL 94-V0, and free of xylene and other hazardous air pollutants. This one part coating is easy to use and repair: it does not require special or costly equipment or materials. It is ideal for chemically challenging environments.

The 4223F urethane protects electric circuits against aggressive chemicals, moisture, dirt, dust, thermal shocks, and scratches. This avoids corrosion and physical damages to electric components. It insulates against high-voltage arcing, shorts, and static discharges, allowing for traces to be put closer to one another.

Applications & Usages

The 4223F coating improves reliability, operational range, and lengthens the life of electrical and electronic components and assemblies. It finds application especially for corrosive environments such as those found in the farming, mining, smelting, oil exploration, and marine industries.

Common urethane conformal coatings uses are with electric generators, motors, transformers, relays, and air bag controllers. Commercial applications include fire alarms components, sensors, automotive electronics, electrical connectors, and porcelains.

Benefits

- **Meets UL 94V-0** (Similar to file # [E203094](#))
- **Externally Qualified** to the August 2002 [IPC-CC-830B](#)-class A, by Pacific Testing Laboratories
- **Excellent finish**—smooth, flexible, mar resistant
- **High Chemical Resistance**—resists water, solvents, and most household chemicals
- **Durable**—abrasion resistant
- **Protects electronics from** moisture, corrosion, fungus, and static discharges
- **Easy to inspect**—fluoresces under black light (UV light)
- **Easy rework and repairs**—can solder through coat • removable with MG 8310 Conformal Coating Stripper
- **Free of isocyanate, xylene, and other hazardous air pollutants**

Curing & Work Schedule

<i>Properties</i>	<i>Value</i>
Tack Free	15 min
Recoat time	3 min
Full Cure @80 °C [176 °F]	24 h
Shelf Life	1 year
Storage Temperature Limits	-5 to +40 °C [+23 to +104°F]

a) Assumes let 1:1 let down with MG 4354 Thinner solvent

Service Ranges

<i>Properties</i>	<i>Value</i>
Service Temperature	-40 to +145 °C [-40 to +293 °F]
Maximum coverage per liter ^{b)}	≤114 000 cm ² [≤123 ft ²]
Maximum coverage per US gallon ^{b)}	≤435 000 cm ² [≤468 ft ²]

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

Chemical Components

Name	CAS Number
Polyurethane Resin	proprietary
Stoddard solvent	8052-41-3
Methyl Ethyl Ketone (MEK)	78-93-3

Properties of Cured 4223F

<i>Physical Properties</i>	<i>Method</i>	<i>Value</i>
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	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 hours)	IPC-TM-650 Test 2.6.3.4	$9 \times 10^{12} \Omega$

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

Properties of Uncured 4223F

<i>Physical Property</i>	<i>Method</i>	<i>Value</i>
Odor	—	Mild, pungent
Viscosity @25 °C [77 °F]	Brookfield SP1	330 cP [0.330 Pa·s]
Density	ASTM D 1475	0.89 g/ml
Flash Point	Closed Cup	-3 °C [26 °F]
Boiling Point		≥80 °C [≥176 °F]
Solids Content (w/w)		44.8%

Compatibility

The 4223F polyurethane coating 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 4223F-Liquid **Safety Data Sheet** (SDS) for more details on transportation, storage, handling and other security guidelines.

Environmental Impact: The volatile organic content is 55% (486 g/L) by EPA and WHMIS standards.



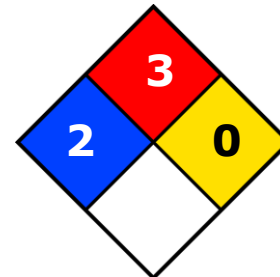
This product meets the European Directive 2011/65/EU Annex II (ROHS); recasting 2002/95/EC.

Health and Safety: The liquid and spray 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 recommendations, use NIOSH approved respirator with organic vapor cartridges rated for this order of concentrations.

The cured coating presents no known hazard.

Spray Gun Application Instructions

Follow the procedure below for best results.

To apply the required thickness by weight

1. Mix thoroughly, and spray a test pattern.
This step ensures good flow quality and helps establish appropriate distance to avoid runs.
2. At a distance of 20 to 25 cm (8 to 10 inches), hold the gun at around 45°, and spray a thin and even coat onto the horizontal board. For best results, use spray-and-release strokes with an even motion to avoid excess paint in one spot.
3. Before the next coat, rotate the board 90° to ensure good coverage.
4. Wait at least 2 minutes, and spray another coat. The delay avoids trapping solvent between coats.
5. Apply other coats until desired thickness is achieved. (Go to Step 3)
6. Let dry for 3-5 minutes (flash off time) at room temperature.

To accelerate cure by heat

- After flash off, put in oven or under heat lamp at ≤ 80 °C for 18 hours.

Packaging and Supporting Products

Cat. No.	Form	Net Volume	Net Weight
4223F-1L	Liquid	0.9 L 32 fl oz.	0.92 kg 2.0 lb
4223F-4L	Liquid	3.8 L 1 gal	3.69 kg 8.1 lb
4223F-20L	Liquid	20.0 L 5 gal	18.43 kg 40.6 lb

Thinners & Conformal Coating Removers

- Cat. No. 4352-1L (32 oz), 4352-4L (1 gal) Conformal Coating Thinner 2
- Cat. No. 8310 Conformal Coating Stripper

Electronic Cleaners

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



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

Premium Polyurethane Conformal Coating 4223F Technical Data Sheet

4223F-Liquid

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.

Email: support@mgchemicals.com

Phone: 1-800-340-0772 Ext. 1030 (Canada, Mexico & USA)

1-905-331-1396 Ext. 1030 (International)

Fax: 1-905-331-2862 or 1-800-340-0773

Mailing address: **Manufacturing & Support**
1210 Corporate Drive
Burlington, Ontario, Canada
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Head Office
9347-193rd Street
Surrey, British Columbia, Canada
V4N 4E7

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.



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4223F-Liquid

Appendix A

Standards Qualification

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

<i>Qualification Criteria</i>	<i>Test Method</i>	<i>Results</i>
UL 94V-0		
Coating flammability	UL 94V (File # E203094)	94V-0
IPC-CC-830B*		
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	IPC-TM-650 2.6.11.1	fail

Note: The optional humidity ageing test failed due to a late stage loss of clarity that prevented color codes and identification marking to be viewed; this product thus meets the older 2002 IPC-CC-830B Class A requirements, but not the current ones.

*Qualified independently by Pacific Testing Laboratories, Inc.