

Conformal Coating Description

Our 4223 Urethane Conformal Coating offers a highly chemical-resistant finish that meets UL standards for indoor conformal coatings. This one part coating is easy to use: it does not require special or costly equipment to apply. It is ideal for extremely corrosive environments.

The 4223 polyurethane protects electric circuits against corrosive chemicals, moisture, dirt, dust, thermal shocks, and scratches. This avoids corrosion and physical damages to electric components. It also insulates against high-voltage arcing, shorts, and static discharges.

Polyurethane Applications & Usages

The 4223 polyurethane improves reliability, operational range, and lengthens the life of electrical and electronic parts. You will find it mainly in corrosive environments such as farming, mining, smelting, oil exploration, and marine industries. As well, it applies to any other areas where corrosion must be avoided.

Common urethane conformal coatings industrial uses are with electric generators, motors, transformers, relays, and equipment controllers. Commercial applications span fire alarms, sensors, automotive electronics, electrical connectors, and porcelains.

For example, poultry or hog farmers can use the 4223 Conformal Coating to protect sensors and electronics in modern farms against the atmospheric ammonia, urea, hydrogen sulfide, and humidity generated by animal waste and fertilizers.

Polyurethane Benefits

- **Excellent Chemical and Abrasion Resistance**
- **Meets indoor UL** conformal coating specifications for a 2 mil thick coat on a 0.8 mm, FR-4 laminate
- **Flammability:** meets UL 94V-1
- **Class F Temperature Rating:** 160 °C [320 °F]
- **Transparent Appearance:** the clear amber coat lets you see problems if they occur
- **Protects electronics from** chemical corrosion, oil, moisture, fungus, and static discharges
- **Good Fungus Resistance**
- **Easy to inspect:** fluoresces under UV light

Curing & Work Schedule*

<i>Properties</i>	<i>Value</i>
Set to Touch	30 minutes
Tack Free	60 minutes
Full Cure (at room temp.)	24 hours
Full Cure (at 65 °C [149 °F])	60 minutes

*Cure times assume a minimum thickness of 1 mil and standard conditions.

Service Ranges

<i>Properties</i>	<i>Value</i>
Service Temperature	-40 to +160 °C [-85 to +320 °F]
Max coverage per 1L** for 25 µm [1 mil]	<127 000 cm ² [<136 ft ²]

**Estimated based on ideal values. Actual value will be somewhat less than quoted.

Chemical Components

Name	CAS Number
Polyurethane Resin	proprietary
Xylene	1330-20-7
Ethyl Benzene	100-41-4

Properties of Cured 4223

<i>Physical Properties</i>	<i>Method</i>	<i>Value</i>
Color	Visual	Clear Amber
Solderability	—	Yes
Abrasion Resistance	—	Superior
Fungus Resistance	MIL-V-173C-2	Meets
Flexibility	—	Good
Flammability	UL 94	Meets 94V-1
<i>Electric Properties</i>	<i>Method</i>	<i>Value</i>
Dielectric Strength (dry)	ASTM D 115	1,800 volts/mil
(wet)	ASTM D 115	1,200 volts/mil
<i>Chemical Resistance</i>	<i>Method</i>	<i>Value</i>
Water	—	Good
Acid (10% sulfuric acid)	—	Excellent
Alkali (1% sodium hydroxide)	—	Excellent
Salt water	—	Excellent
Oil	ASTM D-115	Passed
Copper corrosion	—	None

Properties of Uncured 4223

<i>Physical Property</i>	<i>Method</i>	<i>Value</i>
Odor	—	Aromatic
Viscosity at 25 °C [77 °F]	Brookfield ASTM D 2196	130 to 270 cP
Specific gravity at 21 °C [77 °F]	ASTM D 287	0.94
Flash Point	ASTM D 3278	27 °C [81°F]
Boiling Point		Not established
Solids Content (w/w)		32%
Dry Film Thickness per dip		~25 to 38 µm
Dry Film Thickness per dip		[~1 to 1.5 mil]

Compatibility

The 4223 urethane 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 in the next section.)

Packaging and Supporting Products

Product Availability

- Cat. No. 4223-55ML (2 oz) / 4223-1L (950 ml (1 quart)) / 4223-4L (1 gal) / 4223-20L (5 gal) Liquid

Thinners & Conformal Coating Removers

- Cat. No. 435-55ML (2 oz), 435-1L (33 oz), 435-4L (1 gal) Conformal Coating Thinner

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

Health, Safety, and Environmental Awareness

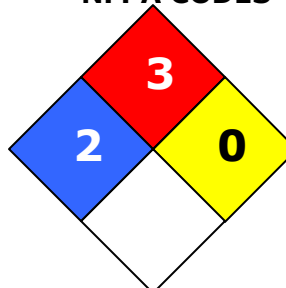
Please see the 4223 **Material Safety Data Sheet** (MSDS) for more details on transportation, storage, handling and other security guidelines.

Environmental Impact: The 4223 formulation is designed for industrial use. It has a VOC of 569 g/L. Avoid runoff into storm and sewer drains.

HMIS RATING

HEALTH:	2
FLAMMABILITY:	3
PHYSICAL HAZARD:	0
PERSONAL PROTECTION:	1

NFPA CODES



Health and Safety: The coating solvents are 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. Toxic solvents therein can cause irritation and other symptoms like headaches, pain, as well as having long term exposure effects.

Wear safety glasses and disposable viton gloves. Teflon gloves may be used for handling periods of less than 4 hours. Wash hands thoroughly after use. Use in the open air, in fume hoods, or in area with engineered ventilation controls to keep airborne levels below allowable thresholds. For short or long term (8 hour workday and 40 hour workweek) at levels of exposures exceeding 100 ppm xylene or 100 ppm ethyl benzene, 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. For automated spray booths, follow the instrument manufacturers guidelines.

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 30 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 60 minutes at room temperature.

To cure the conformal coating

Full cure can be achieved in less than 60 minutes by using an infrared lamp or in convection oven at 65 °C [149 °F]. At room temperature, full cure takes about 24 hours.

The procedure above is based on a minimum thickness of 25 µm (1 mil) conformal coating. After full cure, measure the actual conformal coating thickness to ensure it meets the applications requirements.



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

Urethane Conformal Coating 4223 Technical Data Sheet

4223-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: 1-800-201-8822 Ext. 128 (Canada, Mexico & USA)
1-604-888-3084 Ext. 128 (International)

Fax: 1-604-888-7754 or 1-800-708-9888

Mailing address: **Manufacturing & Support**
1210 Corporate Drive
Burlington, Ontario, Canada
L7L 5R6

Head Office
9347-193rd Street
Surrey, British Columbia, Canada
V4N 4E7

Disclaimer

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