Urethane Conformal Coating 4223 Technical Data Sheet

4223-Liquid

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 animals waste and fertilizers.

Features & 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** chemicals corrosion, oil, moisture, fungus, and static discharges
- **Good Fungus Resistance**
- **Easy to inspect**: fluoresces under UV light

Curing & Work Schedule*

Properties	*Value*
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

Properties	*Value*
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.

Rev. Date: 29 February 2016 / Ver. 2.00

Chemical Components

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

Properties of Cured 4223

Physical Properties	***Method***	***Value***
Color	Visual	Clear Amber
Solderability	—	Yes
Abrasion Resistance	—	Superior
Fungus Resistance	MIL-V-173C-2	Passed
Flexibility	—	Good
Flammability	UL 94	Meets 94V-1
Electric Properties	***Method***	***Value***
Dielectric Strength (dry)	ASTM D 115	1,800 volts/mil
(wet)	ASTM D 115	1,200 volts/mil
Chemical Resistance	***Method***	***Value***
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

Physical Property	***Method***	***Value***
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 [~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.)

Health, Safety, and Environmental Awareness

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

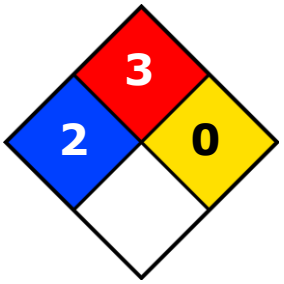
Environmental Impact: The 4223 formulation is designed for industrial use. It has a VOC of 569 g/L. Avoid runoff into storm and sewer drains.

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.

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 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.

Application Instructions

The 4223 can be easily applied by paintbrush, spray gun, or dip method. We recommend a final dry film thickness of at least 1.0 mil [25 μm] for most applications.

Prerequisites

Clean and dry the surface of the substrate to remove

- Oil, dust, water, solvents, and other contaminants

Material & Equipment

- Mixing spatula
- Clean paint brush ***OR*** HVLP spray gun ***OR*** dip tank system
- Thinner/Cleaner solvent
- Personal protection equipment (See 4233F-Liquid SDS)

Paint Dilution Ratios

For brush, dip, or spray applications, the MG 4223 is ready-to-use without dilution.

Dilute as needed to help achieve better coat leveling, ease brush application, or to systematically reduce the dry film thickness. Also consider the equipment manufacturer and operator preferences when adjusting the dilution ratios. The recommended thinner is the MG 4354 Thinner 4.

Spray Gun Application Instructions

Read the procedure below fully and make necessary adjustments to get the required coat thickness for your needs.

Spray Equipment

Use a HVLP (high-volume, low pressure) spray gun using the initial settings described in the following table. Adjust these settings and recommendations as required.

Initial Setting Recommendations

Air Cap	#3 HVLP		
Pressure	*Inlet* 23 psi	*Air flow* [b)] 13.5	*Air cap* 10 psi
Fluid Tip	1.3 mm [0.051”]	1.5 mm [0.059”] [a)]	

Note: These recommendations are based on a DeVilbiss FinishLine paint gun, and may differ with other brands. Please consult your spray gun manufacturer’s guide.

a) If no or reduced let down is performed, this may be a better tip choice.

b) SCFM = standard cubic foot per minute

Spray Gun Application Instructions

Follow the procedure below for best results. For automated spray booths, follow the instrument manufacturers guidelines.

To apply the required coating thickness

1. Mix the paint thoroughly with a paint shaker, mixer, or spatula.
2. (Optional) Dilute according to a ratio of your choice.
3. Make a test spray. Adjust the spray settings for best flow and spray quality, and establish an appropriate distance to avoid paint runs. A distance between 20 to 25 cm (8 to 10 inches) is recommended.
4. Spray a thin and even coat onto the vertical surface to be coated. For best results, start your movement off the surface before pressing and releasing the trigger. Use a uniform movement of the spray gun parallel to the surface.
5. Wait at least 10 minutes and spray another coat. This delay avoids trapping solvent between coats.
6. (Optional) Prior to the application of a new coat, rotate the board 90° to ensure good coverage.
7. Apply additional coats until desired thickness is achieved. (Go to Step 3).
8. Let dry for 30 minutes at room temperature before handling.

To cure the conformal coating

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.

Packaging and Supporting Products

Cat. No.	*Form*	*Net Volume*		*Net Weight*		*Packing Weight*	
4223-55ML	Liquid	55 mL	1.86 fl oz	51 g	1.82 oz	1 kg	2.1 lb
4223-1L	Liquid	945 mL	1 qt	888 g	1.96 lb	5.2 kg	11.5 lb
4223-4L	Liquid	3.78 L	1 gal	3.55 kg	7.83 lb	3.8 kg	8.4 lb
4223-20L	Liquid	18.9 L	5 gal	17.7 kg	39 lb	19 kg	41.9 lb

Note: Packing weight are estimates and may vary based on packing material used for the order.
a) Estimated packing weight for a case pack of 5

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

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 (Canada, Mexico & USA)
1-905-331-1396 (International)
Fax: 1-905-331-2862 or 1-800-340-0773

Mailing address:

Manufacturing & Support
1210 Corporate Drive
Burlington, Ontario, Canada
L7L 5R6

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

Warranty

M.G. Chemicals Ltd. warranties 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.

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