Urethane Conformal Coating

Description

4223 is a one-part, fast drying, thermoplastic 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 may be removed with appropriate strippers, or soldered through for repair or rework.

4223 protects printed circuit boards in extremely corrosive environments. It protects against moisture, fungus, dirt, dust, thermal shock, abrasion, short circuit, high-voltage arcing, and static discharge.

Features and Benefits

- *Meets UL 746E conformal coating specifications for indoor use at 2 mil thickness on a 0.8 mm FR-4 laminate*
- *Meets UL 94V-1 flammability rating*
- *Fluoresces under UV-A light (blacklight)*
- *Isocyanate-free*

Usage Parameters

Properties	Value
Set to touch	30 min
Tack free	1 h
Full cure @22 °C [72 °F]	24 h
Full cure @65 °C [149 °F]	1 h
Shelf life	5 y
Theoretical coverage per liter [a)]	≤93 000 cm^2 [≤14 000 in^2]
Theoretical coverage per US gallon [a)]	≤353 000 cm^2 [≤54 000 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	-40 to 160 °C [-40 to 320 °F]

Cured Properties

Physical Properties	Method	Value
Color	Visual	Clear amber
Solderability	—	Good
Abrasion resistance	—	Excellent
Fungus resistance	MIL-V-173C-2	Excellent
Flexibility	—	Good
Flammability	UL 94	Meets 94 V-1
Electrical Properties	**Method**	**Value**
Dielectric strength (dry)	ASTM D 115	1 800 V/mil [70.9 kV/mm]
Dielectric strength (wet)	ASTM D 115	1 200 V/mil [47.2 kV/mm]
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

Cured Properties

Mechanical Properties	Method	Value
Pencil hardness (ABS)	ASTM D 3363	H, hard

Uncured Properties

Physical Properties	Method	Value
Odor	—	Aromatic
Viscosity @25 °C [77 °F]	Brookfield ASTM D 2196	130–270 cP
Specific gravity @21 °C [77 °F]	ASTM D 287	0.94 g/mL
Flash point	ASTM D 3278	27 °C [81 °F]
Boiling point	—	Not established
Solids content (w/w)	—	32%
Dry film thickness per dip	—	~25–38 mm [~1–1.5 mil]

Compatibility

The 4223 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.

Health and Safety

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

Warning: This product contains 2-butanone, oxime (MEKO); therefore, use in a well-ventilated area and continue ventilation for 10 minutes after use.

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. Dilute coating with 435 Thinner. Adjust ratio if required.
2. Stir the coating gently but thoroughly.
3. Spray a test pattern to ensure good flow quality.
4. 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.
5. Wait 15 min before applying another coat to avoid trapping solvent.
6. Rotate the board 90° and spray again to ensure good coverage.
7. Apply other coats until desired thickness is achieved (go to step 3).
8. Let dry for 15 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.

Cure Instructions

Room temperature cure:

- Let cure at room temperature for 24 h.

Heat cure:

- Put in oven at 65 °C [149 °F] for 1 h.

Packaging and Supporting Products

Cat. No.	Packaging	Net Volume	Net Weight	Packaged Weight
4223-55ML	Bottle	55 mL [1.86 fl oz]	51.7 g [1.82 oz]	196 g [0.43 lb] a)
4223-1L	Can	945 mL [1.99 pt]	888 g [1.96 lb]	1.04 kg [2.29 lb] a)
4223-4L	Can	3.78 L [3.99 qt]	3.55 kg [7.83 lb]	4.00 kg [8.81 lb]
4223-20L	Can	18.9 L [4.99 gal]	17.7 kg [39.1 lb]	20.5 kg [45.2 lb]

a) Case pack of 5

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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