

Description

The 422B *Silicone Modified Conformal Coating* is a clear and flexible coating that is ideal for protecting electronic circuits in high temperature environments or applications requiring extreme flexibility. It protects against moisture, dirt, dust, and other particulates, and thus avoids corrosion of electronic components. It also insulates against high-voltage arcing, shorts, and static discharges. As well, it protects against thermal shock and puts very little stress on components during temperature cycling.

Compared to other typical silicones, the 422B is a one-part, acrylated silicone which makes it is easier to apply, remove, and rework. Also, it has a faster cure time and a much longer shelf life. It is available in both aerosol, liquid, and pen form and may be applied by spraying, dipping, or brushing.

The 422B protective coating is UL certified under the *Coatings for Use on Recognized Printed Wiring Boards—Component* category. It performs as a 94V-0 non-flammable coating. It is intended as an easy-to-use, cost-effective solution for protection against the typical risks PCB's face in high temperature environments. It is not intended for high voltage applications (>1500 V) with extended exposures (days) to very high humidity (>95%) and temperature environments (>65 °C [149 °F]). Customers with such applications should inquire about our line of silicone conformal coatings from Momentive Performance Materials.

Applications & Usages

The 422B improves reliability and lengthens the life of electronic circuitry. Its primary applications are in the automobile, marine, aerospace, aviation, communication, instrumentation, and industrial control equipment industries that involve high temperatures.

Benefits and Features

- **Certified *UL 94V-0*** (File # [E203094](#))
- **Maximum constant service temperature of 200 °C**
- **Fast cure**—tack free in 7 min at room temperature, drying time in 20 min at 65 °C
- **Protects electronics** from moisture, corrosion, fungus, thermal shock, and static discharges
- **Easy to inspect:** fluoresces blue at 437 nm ± 65 nm under UVA light
- **Extended shelf life** avoids worries about premature hardening and wastage
- **Easy rework and repairs:** Solders through the coat • removable with Cat. No. 435 thinner or Cat. No. 8310 stripper



Silicone Modified Conformal Coating 422B Technical Data Sheet

Usage Parameters

| <i>Properties</i> | <i>Value</i> |
|---|---|
| Tack Free | 5-7 min |
| Shelf life | 5 y |
| Drying Time @20 °C [68 °F] | 48 h |
| Drying Time @65 °C [149 °F] | 20 min |
| Theoretical HVLP Spray Coverage ^{a)} | ≤61 800 cm ² /L ≤6.18 m ² /L ≤234 000 in ² /gal ≤252 ft ² /gal |

a) Idealized estimate based on a coat thickness of 25 µm [1.0 mil] and 100% transfer efficiency

Temperature Ranges

| <i>Properties</i> | <i>Value</i> |
|------------------------------|----------------------------------|
| Constant Service Temperature | -40 to 200 °C [-40 to 392 °F] |

Principal Components

| Name | CAS Number |
|--|--------------------|
| Silicone and acrylic resin combination | <i>proprietary</i> |
| Xylene | 1330-20-7 |
| Acetone | 67-64-1 |
| Ethyl benzene | 100-41-4 |

Cured 422B Properties

| <i>Physical Properties</i> | <i>Method</i> | <i>Value</i> |
|---|-----------------------------------|-----------------------------|
| Color | Visual | Clear |
| Solderability | — | Fair |
| Flexibility | — | Excellent |
| Flammability | UL File # E203094 | 94V-0 |
| UV inspection absorption max | Absorption spectrum | 375 nm (near UV) |
| fluorescence max | Emission spectrum | 437 nm (blue) |
| <i>Electric Properties</i> | <i>Method</i> | <i>Value</i> |
| Dielectric Strength at 0.0150 inches | IPC-TM-650 Test 2.5.6.1 | 1056 V/mil |
| Volume Resistivity @23 °C 50% RH | ASTM D 257-07 | 1.2 x 10 ¹⁵ Ω·cm |
| Surface Resistivity | " | 4.5 x 10 ¹⁶ Ω/sq |
| Dielectric Constant @60 Hz, 25 °C [77 °F] | ASTM D 150-98 | 2.35 |
| Dielectric Constant @1 MHz, 25 °C [77 °F] | " | 1.99 |
| Dissipation Factor @60 Hz, 25 °C [77 °F] | " | 0.037 |
| @1 MHz, 25 °C [77 °F] | " | 0.012 |

| <i>Thermal Properties</i> | <i>Method</i> | <i>Value</i> |
|---|------------------------|---|
| Coefficient of Thermal Expansion | IPC-TM-650 Test 2.4.24 | 253 ppm/°C |
| Glass Transition Temperature | " | none detected |
| Softening Point | " | 31 °C [88 °F] |
| <i>Environmental & Ageing Study</i> | <i>Method</i> | <i>Value</i> |
| Salt Spray Test: 7 day @35 °C +Salt/Fog | ASTM B117-2011 | 5B = 0% area removed None No change None |
| Cross-hatch adhesion | ASTM D3359-2009 | |
| Cracking, unwashed area | ASTM D661-93 | |
| Visual Color, unwashed area | ASTM D1729-96 | |
| Peeling, unwashed area | " | |

Uncured 422B Properties

| <i>Physical Property</i> | <i>Method</i> | <i>Value</i> |
|--------------------------|----------------|--------------------|
| Odor | — | Ethereal |
| Viscosity @23 °C [73 °F] | Brookfield SP1 | 60 cP [0.060 Pa·s] |
| Density | | 0.898 g/mL |
| Flash Point | Closed Cup | -18 °C [-0.40 °F] |
| Boiling Point | | 55 °C [131 °F] |
| Solids Content (w/w) | | 28% |

Compatibility with Substrate

The 422B silicone 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 cleaners 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 5).

Health, Safety, and Environmental Awareness

Please see the 422B **Safety Data Sheet** (SDS) for more details on transportation, storage, handling and other security guidelines.

Environmental Impact: The 422B formulation is free from ozone depletion compounds. The coating is RoHS compliant.

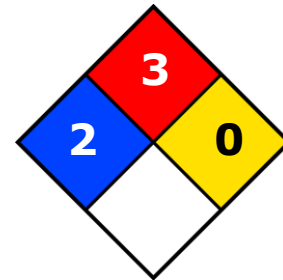
Health and Safety: The liquid is flammable and should be kept away from flames and other ignition sources. As with most paint materials, avoid breathing in fumes or direct contact with the material. Solvents therein can cause irritation and other symptoms like headaches, pain, as well as having long term exposure effects. The cured coating presents no known hazard.

Wear safety glasses and disposable nitrile gloves for short contact (<4 hours). For extended contact use Viton 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 100 ppm xylene or 750 ppm acetone, use NIOSH approved respirator with organic vapor cartridges rated for this order of concentrations.

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)

Spray Gun Application Instructions

Read the procedure below and make necessary adjustments according to your spray gun equipment usage instructions.

Thinning Requirements

Let down is not required for 422B and will usually lead to a dry film thickness of roughly 1 mil [25 µm] in one coat (depending on the operator). When diluted 1:1, each coat results in a dry film thickness of roughly 0.5 mil [13 µm].

If higher solid percent grade or custom blends are used, contact us for details.

ATTENTION! MG Chemicals recommends a dry film thickness of 25 to 38 µm [1 to 1.5 mil]. Since it is a solvent-based and acrylated silicone system, the thickness upper limit is below 75 µm [3 mil]. The usual limits for solvent-less silicone systems that have thermosetting cure mechanisms do not apply.

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 | <i>Inlet</i> 23 psi | <i>Air flow</i> ^{b)} 13.5 | <i>Air cap</i> 10 psi |
| Fluid Tip | 1.3 mm [0.051"] | 1.5 mm [0.059"] ^{a)} | |

Note: These recommendations are based on a generic paint gun and may differ by 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

To apply the required thickness

1. Mix the paint thoroughly with a paint shaker, mixer, or spatula.
2. Dilute by a ratio of **1:1** (Paint:Thinner) or another 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 23 to 30 cm (9 to 12 in) is recommended.
4. Spray a thin and even coat onto the vertical surface to be coated. For best results, start your movement off-surface, press the trigger, and only release off-surface at the end of the stroke. Use a uniform movement of the spray gun parallel to the surface.
5. Wait at least 5 minutes and spray another coat. This delay avoids trapping solvent between coats.
6. 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 7 minutes (flash off time) at room temperature.

ATTENTION! Spraying overly thick coats may cause paint runs and hamper solvent evaporation. Prefer the application of many thin wet coats rather than fewer heavy coats.

Pen Application Instructions

Follow the procedure below for best results.

To apply the liquid pen

1. Ensure that the surface to be coated is clean and oil-free.
2. Shake the pen vigorously.
3. Test on a blank to ensure good flow quality and uniformity during application.
4. Touch the pen lightly on the surface while squeezing the barrel to apply thin and even coat.
5. Let dry for 3-5 minutes (flash off time) at room temperature before handling.

To cure the conformal coating

- Full cure can be achieved in 48 hours at room temperature.
- Full cure can be achieved in 20 minutes by using an infrared lamp or in convection oven at 65 °C [149 °F].

Note: 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. Custom cure instructions are required for higher thicknesses (contact us for details).

Packaging and Supporting Products

| Cat. No. | Form | Net Volume | | Net Weight | | Shipping Weight | |
|------------------|-------------|-------------------|------------|-------------------|---------|------------------------|----------------------|
| 422B-55ML | Liquid | 55 mL | 1.8 fl oz | 49 g | 1.7 oz | 1.0 kg | 2.1 lb ^{a)} |
| 422B-1L | Liquid | 945 mL | 2 pt | 848 g | 1.87 lb | 5.2 kg | 11 lb ^{a)} |
| 422B-4L | Liquid | 3.78 L | 1 gal | 3.39 kg | 7.48 lb | 3.8 kg | 8.3 lb |
| 422B-20L | Liquid | 18.9 L | 5 gal | 16.9 kg | 37 lb | 20 kg | 45 lb |
| 422B-P | Pen | 5 mL | 0.16 fl oz | 4.4 g | 0.15 oz | 0.02 kg | 0.04 lb |
| 422B-340G | Aerosol | 425 mL | 14 fl oz | 340 g | 12 oz | 4.6 kg | 10 lb ^{b)} |

Contact MG Chemicals if custom packaging or sizes are required

a) Pack of five bottles

b) Pack of ten cans

Thinners & Conformal Coating Removers

- *Thinner:* Cat. No. 435-55ML (2 oz), 435-1L (33 oz), 435-4L (1 gal)
- *Conformal Coating Stripper:* Cat. No. 8310-100ML

Electronic Cleaners

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

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)

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

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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.