

## One-part Epoxy, Electrically Conductive Adhesive, Low T<sub>g</sub>

### Description

9400 is an electrically conductive, silver-filled, one-part epoxy adhesive with a low cure temperature. It is smooth, thixotropic, non-sagging, and bonds well to a wide variety of substances. It has an unlimited working life at room temperature and does not require frozen storage.

This product can create electrically conductive bonds where soldering is not an option, such as when bonding to heat-sensitive components, glass, soft metals, or conductive polymers. It also works well in semi-conductor packaging, micro-electronic attachment and lid-sealing, and as a die attach for small chips, LEDs and diodes. It does not require mixing and can be readily used in manual, pneumatic and robotic dispensing processes.

9400 has been formulated to have a low T<sub>g</sub>, which allows for minimal stress on substrates during temperature changes. For a higher T<sub>g</sub>, use 9410.

### Features and Benefits

- Resistivity of  $3.1 \times 10^{-4} \Omega \cdot \text{cm}$
- Minimum cure temperature of 70 °C [158 °F]
- Unlimited working life
- Shelf life: up to 12 months at room temperature
- T<sub>g</sub> of 36 °C [97 °F]
- Thermal conductivity of 4.7 W/(m·K)
- Strong resistance to humidity, salt water, bases, and aliphatic hydrocarbons

## Usage Parameters

| Properties                  | Value                    |
|-----------------------------|--------------------------|
| Working life @22 °C [72 °F] | Unlimited                |
| Shelf life @22 °C [72 °F]   | <12 months <sup>a)</sup> |
| Full cure @22 °C [72 °F]    | Heat cure only           |
| Full cure @70 °C [158 °F]   | 2 h                      |
| Full cure @80 °C [176 °F]   | 30 min                   |

a) 9400-30ML has a 6 month shelf life

## Temperature Ranges

| Properties                   | Value                         |
|------------------------------|-------------------------------|
| Constant service temperature | -55 to 140 °C [-67 to 284 °F] |
| Storage temperature          | -10 to 27 °C [14 to 81 °F]    |

## Cured Properties

| Physical Properties                  | Method                           | Value <sup>a)</sup>                              |
|--------------------------------------|----------------------------------|--|
| Color                                | Visual                           | Silver grey                                      |
| Density @25 °C [77 °F]               | ASTM D 1475                      | 3.02 g/mL  |
| Hardness                             | Shore D Durometer                | 74D  |
| Tensile strength                     | ASTM D 638                       | 2.9 N/mm <sup>2</sup> [430 lb/in <sup>2</sup> ]  |
| Compressive strength                 | ASTM D 695                       | 18 N/mm <sup>2</sup> [2 600 lb/in <sup>2</sup> ] |
| Lap shear strength (stainless steel) | ASTM D 1002                      | 2.9 N/mm <sup>2</sup> [430 lb/in <sup>2</sup> ]  |
| Lap shear strength (aluminum)        | ASTM D 1002                      | 3.2 N/mm <sup>2</sup> [460 lb/in <sup>2</sup> ]  |
| Lap shear strength (polycarbonate)   | ASTM D 1002                      | 0.6 N/mm <sup>2</sup> [87 lb/in <sup>2</sup> ]   |
| Electrical Properties                | Method                           | Value  |
| Volume resistivity                   | Method 5011.5<br>in MIL-STD-883H | 3.1 x 10 <sup>-4</sup> Ω·cm                      |
| Volume conductivity                  | Method 5011.5<br>in MIL-STD-883H | 3.2 x 10 <sup>3</sup> S/cm                       |
| Surface resistivity @0.2 mm          | Method 5011.5<br>in MIL-STD-883H | 1.8 x 10 <sup>-2</sup> Ω/sq                      |

*Note: Specifications are for epoxy samples cured at 80 °C for 1 hour and conditioned at ambient temperature and humidity.*

**a)** N/mm<sup>2</sup> = mPa; lb/in<sup>2</sup> = psi

## Cured Properties

| Thermal Properties   | Method   | Value   |
|--|--|---|
| Glass transition temperature (T <sub>g</sub> )                             | ASTM E 831   | 36 °C [97 °F]                                     |
| CTE <sup>a)</sup> prior T <sub>g</sub><br>after T <sub>g</sub>             | ASTM E 831<br>ASTM E 831                           | 76 ppm/°C [169 ppm/°F]<br>100 ppm/°C [212 ppm/°F] |
| Thermal conductivity @25 °C [77 °F]<br>@50 °C [222 °F]<br>@100 °C [212 °F] | ASTM E 1461 92<br>ASTM E 1461 92<br>ASTM E 1461 92 | 4.7 W/(m·K)<br>4.8 W/(m·K)<br>5.1 W/(m·K)         |
| Thermal diffusivity @25 °C [77 °F]   | ASTM E 1461 92                                     | 2.2 mm <sup>2</sup> /s                            |
| Specific heat capacity @25 °C [77 °F]                                      | ASTM E 1269 01                                     | 0.7 J/(g·K)                                       |

*Note: Specifications are for epoxy samples cured at 80 °C for 1 hour and conditioned at ambient temperature and humidity.*

**a)** Coefficient of Thermal Expansion (CTE) units are in ppm/°C = in/in/°C × 10<sup>-6</sup> = unit/unit/°C × 10<sup>-6</sup>

## Uncured Properties

| Physical Properties      | Method      | Value             |
|--------------------------|-------------|-------------------|
| Color                    | Visual      | Silver grey       |
| Viscosity @25 °C [77 °F] | Visual      | Thixotropic paste |
| Density                  | ASTM D 1475 | 3.14 g/mL         |

## Compatibility

**Adhesion**—9400 epoxy 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.

For substrates with weak adhesion strength, surface preparation (such as sanding, or pre-coating with a suitable primer) may improve adhesion.

**Chemical**—The cured epoxy adhesive is inert under normal conditions. It can tolerate short-term exposure to fuels or similar non-polar organic solvents, but it may not be suitable for prolonged exposure. Avoid using with strong acids, strong bases, or strong oxidizers.

## Storage

Store between -10 and 27 °C [14 and 81 °F] in a dry area, away from sunlight. Some of the components are sensitive to air. To maximize shelf life, always recap product firmly when not in use.

## Health and Safety

Please see the 9400 Safety Data Sheet (SDS) for further details on transportation, storage, handling, safety guidelines, and regulatory compliance.

## Application Instructions

For best results, follow the procedure below. This product does not require mixing prior to use, and can be applied with a spatula, trowel, or automated dispensing machine.

### Syringe or cartridge:

1. Twist and remove the cap from the cartridge or syringe. Do not discard the cap.
2. Dispense the adhesive evenly to both surfaces.
  - a. For 30 mL size, insert the cartridge in the 8DG-30-1 dispensing gun (see [Application Guide](#)).
3. To stop the flow, pull back on the plunger.
4. Clean nozzle to prevent contamination and material buildup.
5. Replace the cap on the cartridge or syringe.

## Cure Instructions

### Room temperature cure:

Do NOT cure at room temperature. This product will only cure at elevated temperatures.

### Heat cure:

- Put in oven at 70 °C [158 °F] for 2 h.  
—OR—
- Put in oven at 80 °C [176 °F] for 30 min.

## Dispensing Accessories

Consult the table below for appropriate accessory selection. See the [Application Guide](#) for instructions on using the dispensing accessories.

| Cat. No.  | Dispensing Gun | Static Mixer |
|-----------|----------------|--------------|
| 9400-3ML  | N/A            | N/A          |
| 9400-30ML | 8DG-30-1       | N/A          |

## Packaging and Supporting Products

| Cat. No.  | Packaging | Net Weight       |
|-----------|-----------|------------------|
| 9400-3ML  | Syringe   | 9.42 g [0.33 oz] |
| 9400-30ML | Cartridge | 94.2 g [3.32 oz] |

## 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](http://www.mgchemicals.com).

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