

Silver Conductive Epoxy Adhesive

Description

8331 is an electrically conductive, silver-filled two-part epoxy adhesive. It is smooth, non-sagging, thixotropic, and bonds well to a wide variety of substrates.

This product allows for quick, cold-soldering repairs. It can also be used as a solder replacement for bonding heat-sensitive electronic components, or for making conductive connections where soldering is not an option, such as when bonding to glass, soft metals, or plastics.

8331 has been formulated to be economical. For a higher fill that maximizes conductivity, use 8330. For a longer working life, use 8331S.

Features and Benefits

- Resistivity of $0.007 \Omega \cdot \text{cm}$
- Thermal conductivity of $1.4 \text{ W}/(\text{m} \cdot \text{K})$
- 1:1 mix ratio
- Working life: 10 minutes
- Cure time: 24 hours at room temperature or 15 minutes at $65 \text{ }^\circ\text{C}$ ($149 \text{ }^\circ\text{F}$)
- High tensile, compressive, and lap shear strength
- Low CTE prior T_g
- Strong resistance to humidity, salt water, mild bases, and aliphatic hydrocarbons
- Shelf life: 3 years at room temperature
- RoHS 3 compliant

Usage Parameters

Properties	Value
Working life @22 °C [72 °F] ^{a)}	10 min
Shelf life @22 °C [72 °F]	3 y
Service cure @22 °C [72 °F]	5 h
Full cure @22 °C [72 °F]	24 h
Full cure @65 °C [149 °F]	15 min
Full cure @125 °C [257 °F]	7 min

a) Working life assumes 5 g at room temperature.

Temperature Ranges

Properties	Value
Constant service temperature	-55 to 150 °C [-67 to 302 °F]
Storage temperature	16 to 27 °C [61 to 81 °F]

Cured Properties

Physical Properties	Method	Value ^{a)}
Color	Visual	Silver grey
Density @26 °C [79 °F]	ASTM D 1475	2.4 g/mL
Hardness	Shore D Durometer	70D
Tensile strength	ASTM D 638	13 N/mm ² [1 900 lb/in ²]
Compressive strength	ASTM D 695	39 N/mm ² [5 700 lb/in ²]
Lap shear strength (aluminum 5052)	ASTM D 1002	8.0 N/mm ² [1 160 lb/in ²]
Izod impact ^{b)}	ASTM D 256	1.7 kJ/m ² [0.80 ft·lb/in]
Flexural strength	ASTM D 790	17 N/mm ² [2 500 lb/in ²]
Water absorption (relative mass change)	ASTM D 570	0.04%
Outgassing (total mass loss) @125 °C [257 °F] for 24 h	ASTM E 595	6.27%
Water vapor regain	ASTM E 595	0.09%
Collected volatile condensable materials	ASTM E 595	0.16%

Note: Specifications are for epoxy samples cured at 65 °C for 15 minutes and conditioned at ambient temperature and humidity.

a) N/mm² = mPa; lb/in² = psi

b) Cantilever beam impact

Cured Properties

Electrical Properties	Method	Value
Volume resistivity	Method 5011.5 in MIL-STD-883H	0.007 Ω ·cm
Volume conductivity	Method 5011.5 in MIL-STD-883H	143 S/cm
Surface resistivity @0.2 mm	Method 5011.5 in MIL-STD-883H	0.4 Ω /sq
Thermal Properties	Method	Value
Glass transition temperature (T_g)	ASTM D 3418	50 °C [122 °F]
CTE ^{a)} prior T_g after T_g	ASTM E 831 ASTM E 831	54 ppm/°C [130 ppm/°F] 169 ppm/°C [336 ppm/°F]
Thermal conductivity @25 °C [77 °F] @50 °C [222 °F] @100 °C [212 °F]	ASTM E 1461 ASTM E 1461 ASTM E 1461	1.4 W/(m·K) 1.8 W/(m·K) 1.4 W/(m·K)
Thermal diffusivity @25 °C [77 °F]	ASTM E 1461	0.9 mm ² /s
Specific heat capacity @25 °C [77 °F]	ASTM E 1461	0.7 J/(g·K)
Heat deflection temperature	ASTM D 648	48 °C [118 °F]

Note: Specifications are for epoxy samples cured at 65 °C for 15 minutes and conditioned at ambient temperature and humidity.

a) Coefficient of Thermal Expansion (CTE) units are in ppm/°C = in/in/°C $\times 10^{-6}$ = unit/unit/°C $\times 10^{-6}$

Uncured Properties

Physical Properties	Mixture (A:B)
Color	Silver grey
Density	2.6 g/mL
Mix ratio by volume	1:1
Mix ratio by weight	1.2:1
Solids content (w/w)	93%

Physical Properties	Part A	Part B
Color	Silver grey	Silver grey
Viscosity @25 °C [77 °F]	1 000 000 cP [1 000 Pa·s] ^{a)}	15 000 000 cP [15 000 Pa·s] ^{b)}
Density	2.5 g/mL	2.4 g/mL
Odor	Mild	Amine

a) Brookfield viscometer at 3 rpm with spindle RV S95

b) Brookfield viscometer at 0.6 rpm with spindle RV S96

Compatibility

Adhesion—8331 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, which may affect adhesion. In case of contamination, first clean the surface to be coated with MG Chemicals 824 Isopropyl Alcohol.

For substrate substances with weak adhesion strengths, surface preparation such as sanding or pre-coating with a suitable primer may improve adhesion.

Chemical resistance—Once cured, the epoxy adhesive is inert under normal conditions. It will resist water and salt exposure.

It is expected to resist short term exposures to fuels or similar non-polar organic solvents, but it is not suitable for prolonged exposures. Avoid use with strong acids, strong bases, or strong oxidizers.

Storage

Store between 16 and 27 °C [61 and 81 °F] in a dry area, away from sunlight. Some of the components are sensitive to air, always recap firmly when not in use to maximize shelf life.

Substrate Adhesion (In Decreasing Order)

Physical Properties	Adhesion
Aluminum	Stronger
Steel	↑ ↓
Fiberglass	
Wood	
Paper, Fiber	
Glass	
Rubber	↓
Polycarbonate	
Acrylic	Weaker
Polypropylene	Does not bond

Health and Safety

Please see the 8331 Safety Data Sheet (SDS) parts A and B for further details on transportation, storage, handling, safety guidelines, and regulatory compliance.

Application Instructions

For best results, follow the procedure below. For quantities less than 1 mL or for stricter stoichiometry control, mix by weight with a high-precision balance. Heat cure to achieve optimal conductivity.

Syringe:

1. Twist and remove the cap from the syringe. Do not discard cap.
2. Measure 1 part by volume of A.
3. Measure 1 part by volume of B.
4. Dispense material on a mixing surface or container, and thoroughly mix parts A and B together.
5. To stop the flow, pull back on the plunger.
6. Clean nozzle to prevent contamination and material buildup.
7. Replace the cap on the syringe.

Can or jar:

1. Stir each part individually to re-incorporate material that may have separated during storage.
2. Measure 1.2 part by weight of A.
3. Measure 1 part by weight of B.
4. Thoroughly mix parts A and B together.
5. Apply adhesive to the application area.

Cure Instructions

Room temperature cure:

- Let cure at room temperature for 5 to 24 h.

Heat cure:

- Put in oven at 65 °C [149 °F] for 15 min.
—OR—
- Put in oven at 125 °C [257 °F] for 7 min.

Packaging and Supporting Products

Cat. No.	Packaging	Net Weight	Packaged Weight
8331-14G	2 Syringe kit	14.4 g [0.50 oz]	22 g [0.8 oz]
8331-50ML	2 Jar kit	128 g [4.51 oz]	170 g [0.4 lb]
8331-200ML	2 Can kit	482 g [1.06 lb]	640 g [1.4 lb]

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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