Silver Conductive Epoxy Adhesive
Moderate Cure / High Conductivity
8331 Technical Data Sheet

Description

This is a two-part, smooth, silver paste adhesive that cures to form a hard, durable polymer. In its cured state, it is highly electrically and thermally conductive. It adheres strongly to metals and glass, and it adheres well to most plastics used in electronic assemblies.

It has a convenient 1-to-1 mix ratio and a 10-minute working life. It achieves an operational cure in five hours at room temperature and full cure in a day. At 65 °C, it cures in only 15 minutes.

Applications & Usages

The 8331 can be used as a solder replacement for bonding heat-sensitive electronic components and for making conductive bonds where solder is not an option, such as when bonding to glass, plastics, or soft metals. It allows for quick, cold soldering repairs of electronic devices. Furthermore, it makes excellent thermal connections, provides excellent EMI/RFI shielding, and is very effective at filling in seams between metal plates. It is especially useful in repairing rear window defrosters on automobiles.

Its primary applications are in the repair and assembly of electronic devices. It is used in the automobile, aerospace, marine, communication, instrumentation, and industrial control equipment industries. It is also widely used by hobbyists and makers.

Benefits and Features

- **Electrical resistivity: 0.007 Ω·cm**
- **Thermal conductivity: 0.90 W/(m·K)**
- **1:1 mix ratio by volume**
- **Working life: 10 minutes**
- **Cure time: 24 hours at room temperature or 15 minutes at 65 °C**
- **Good adhesive strength**
- **Strong resistance to water, brine, acids, bases, and aliphatic hydrocarbons**
- **Room temperature storage**
- **Shelf life greater than three years**

Usage Parameters

Properties	*Value*
Working Life [a)]	10 min
Shelf Life	≥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 @90 °C [194 °F]	12 min
Full Cure @125 °C [257 °F]	7 min
Full Cure @150 °C [302 °F]	5 min

a) Cure and life values 5 g and room temperature unless stated otherwise.

Temperature Ranges

Properties	*Value*
Constant Service Temperature	-55 to 150 °C [-67 to 302 °F]
Storage Temperature of Unmixed Parts	16 to 27 °C [60 to 80 °F]

Principal Components

Name	***CAS Number***
Part A: Bis-F Epoxide Resin	*28064-14-4*
Metallic Silver	*7440-22-4*
Part B: Aliphatic Amines	*140-31-8 + 84852-15-3 + 68411-71-2 + 111-40-0*
Metallic Silver	*7440-22-4*

Properties of Cured 8331

Physical Properties	*Method*	*Value* [a)]	
Color	Visual	Silver Grey	
Density @26 °C [79 °F]	ASTM D 1475	2.44 g/mL	
Hardness	Shore D durometer	70D	
Tensile Strength	ASTM D 638	15 N/mm^2	[2 200 lb/in^2]
Elongation	"	0.3%	
Compressive Strength	ASTM D 695	39 N/mm^2	[5 700 lb/in^2]
Shear Strength	ASTM D 732	1.6 N/mm^2	[230 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	ASTM D 570	0.04%	
Outgassing (Total Mass Loss) @ 24 h	ASTM E 595	6.27%	
Water Vapor Release (WVR)	"	0.09%	
Collectable Volatile Condensable Material	"	0.16%	
Solderable		No	

Electric Properties	*Method*	*Value*
Volume Resistivity [c)]	Method 5011.5 in MIL-STD-883H	0.007 Ω·cm

Thermal Properties	*Method*	*Value*
Thermal Conductivity @25 °C [77 °F]	ASTM E 1461	0.903 W/(m·K)
@50 °C [122 °F]	"	0.893 W/(m·K)
@100 °C [212 °F]	"	0.813 W/(m·K)
Glass Transition Temperature (T_g)	ASTM D 3418	50 °C [122 °F]
Heat Deflection Temperature	ASTM D 648	48 °C
CTE [d] prior T_g	ASTM E 831	54 ppm/°C
CTE [d] after T_g	ASTM E 831	169 ppm/°C

Note: Specifications are for epoxy samples that were cured at 65 °C for 15 min. Additional curing time at room temperature was given to allow for optimum curing. Samples were conditioned at 23 °C and 50% RH prior to most tests.

a) N/mm^2 = mPa; lb/in^2 = psi

b) Cantilever beam impact

c) The uncured epoxy mixture does not conduct electricity well and can have high resistance. To attain stated resistivity, ensure that the mix ratio is followed and that the product is fully cured by heat curing. Room temperature cures may give higher resistivity.

d) Coefficient of Thermal Expansion (CTE) units are in ppm/°C = in/in/°C × 10^{-6} = unit/unit/°C × 10^{-6}

Properties of Uncured 8331

Physical Property	*Mixture (1A:1B)*
Color	Silver Grey
Density [a]	2.55 g/mL
Mix Ratio by volume (A:B)	1.0:1.0
Mix Ratio by weight (A:B)	1.2:1.0
Solids Content (w/w)	93%

Physical Property	*Part A*	*Part B*
Color	Silver Grey	Silver Grey
Density	2.46 g/mL	2.37 g/mL
Flash Point	>150 °C [302 °F]	>93 °C [199 °F]
Resistivity of uncured material	Off-scale (no reading)	Off-scale (no reading)

a) Calculated value based on measures densities of each part

Compatibility

Adhesion—As seen in the substrate adhesion table, the 8331 epoxy adheres to most materials found on printed circuit assemblies; however, it is not compatible with contaminants like water, oil, and greasy flux residues that may affect adhesion. If contamination is present, clean the printed circuit assembly with electronic cleaner such as MG Chemicals 4050 Safety Wash, 406B Super Wash, or 824 Isopropyl Alcohol.

Substrate Adhesion in Decreasing Order

Physical Properties	***Adhesion***
Aluminum	Stronger
Steel	
Fiberglass	
Wood	
Paper, Fiber	
Glass	
Rubber	
Polycarbonate	
Acrylic	
Polypropylene [a)]	Weaker

a) Does not bond to polypropylene

Storage

Store between 16 and 27 °C [60 and 80 °F] in dry area away from sunlight. Prolonged storage or storage at or near freezing temperatures can result in crystallization. If crystallization occurs, reconstitute the component to its original state by temporarily warming it to 50 to 60 °C [122 to 140 °F]. To ensure full homogeneity, stir thoroughly the warm component, reincorporating all settled material. Re-secure container lid and let cool down before use.

Health, Safety, and Environmental Awareness

Please see the 8331 **Safety Data Sheet** (SDS) parts A and B for more details on transportation, storage, handling and other security guidelines.

Health and Safety: The 8331 parts can ignite if the liquid is both heated and exposed to flames or sparks.

Wear safety glasses or goggles and disposable polyvinyl chloride, neoprene, or nitrile gloves while handling liquids. Part B in particular causes skin burns and may cause sensitization if exposed over a long period of time. The epoxy will not wash off once cured: wear protective work clothing. Wash hands thoroughly after use or if skin contact occurs. Do not ingest.

Use in well-ventilated area since vapors may cause irritation of the respiratory tract and cause respiratory sensitization in susceptible individuals.

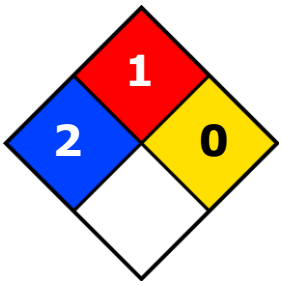
The cured epoxy resin presents no known hazard.

Part A

HMIS® RATING

HEALTH:	* 2
FLAMMABILITY:	1
PHYSICAL HAZARD:	0
PERSONAL PROTECTION:	

NFPA® 704 CODES



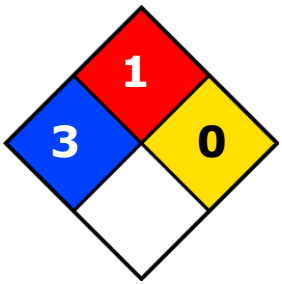
Approximate HMIS and NFPA Risk Ratings Legend:
0 (Low or none); 1 (Slight); 2 (Moderate); 3 (Serious); 4 (Severe)

Part B

HMIS® RATING

HEALTH:	* 3
FLAMMABILITY:	1
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)

Application Instructions

Follow the procedure below for best results. For mixing quantities that are less than 1 mL in size or for stricter stoichiometry control, mix by weight ratio instead (requires a high precision balance). Heat cure is recommended to get the best possible conductivity.

To prepare 1:1 (A:B) epoxy mixture

1. Remove syringe cap or jar cover.
2. For jars, stir each part individually to re-incorporate material that may have settled during storage.
3. Measure ***one*** part by volume of ***A***.
4. Measure ***one*** part by volume of ***B***.
5. Thoroughly mix the parts together with a stir stick until homogeneous.
6. Apply to with an appropriate sized stick for the application area.

CAUTION!
Do not cross contaminate. To avoid premature curing, use different stirring tools for parts A & B.

NOTE: Remember to recap the syringe or container promptly after use.

TIP: Due to the high viscosity and abrasiveness of the silver filler, you may preheat part A and part B to increase the flow and improve air release, but doing so will also reduce the working time by about half for each 10 °C increments.

To heat cure the 8331 epoxy

Put in oven at 65 °C [149 °F] for 15 minute.

TIP: Hair dryers are normally rated not to exceed 60 °C, so they can generally be used to accelerate the cure.

You can cure the epoxy faster by using higher temperatures of up to 150 °C [302 °F].

ATTENTION: Keep the curing temperature well below temperature limit of heat sensitive components that may be present. As a guideline, remember that commercial grade devices normally can be safely operated up to 70 °C, industrial grade up to 85 °C, and military grade up to 175 °C.

ATTENTION: Heat guns can easily exceed the temperature limits for your assembly: they should not be used.

To room temperature cure the 8331 epoxy

Let stand for 5 to 24 hours.

TIP: While the product can be cured at room temperature, the best conductivity is achieved with the application of some heat.

Application Notes

A slight discoloration of the 8331 epoxy may occur over time. The discoloration does not affect the adhesiveness or conductivity.

This product cannot be soldered through cleanly and safely for the printed circuit assembly components.

Packaging and Supporting Products

Cat. No.	*Packaging*	*Net Volume*		*Net Weight*		*Packaging Weight*	
8331-14G	Syringe	6 mL	0.2 fl oz	14.4 g	0.51 oz	22 g	0.8 oz
8331-50ML	Jar	53 mL	1.7 fl oz	128 g	4.52 oz	170 g	0.4 lb
8331-200ML	Can	200 mL	6.7 fl oz	482 g	1.06 lb	640 g	1.4 lb

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.

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Warranty

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