

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 long 4 hour working life. The mixed adhesive essentially acts like a one-part adhesive for the duration of a shift. But unlike one-part adhesives, it does not require high curing temperatures or frozen storage, and it has a very long shelf life.

Applications & Usages

The 8331S is 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, soft metals, or plastics. It allows for quick cold soldering repairs of electronic devices, makes excellent thermal connections, provides excellent EMI/RFI shielding, and is very effective at filling in seams between metal plates. It is useful in applications where the high cure temperatures of one-part epoxy systems can potentially damage components.

Its primary applications are in 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: 0.0060 Ω ·cm**
- **Thermal conductivity: 0.85 W/(m·K)**
- **1:1 mix ratio by volume**
- **Working life: 4 hours**
- **Cure time: 2 hours 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**

ENVIRONMENT

- ✓ RoHS
- ✓ REACH compliant

Usage Parameters

<i>Properties</i>	<i>Value</i>
Working Life ^{a)}	4 h
Shelf Life	≥3 y
Full Cure @65 °C [149 °F]	2 h
Full Cure @80 °C [176 °F]	1 h
Full Cure @100 °C [212 °F]	40 min

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

Temperature Ranges

<i>Properties</i>	<i>Value</i>
Constant Service Temperature	-40 to 150 °C [-40 to 302 °F]
Storage Temperature of Unmixed Parts	22 to 27 °C [72 to 80 °F]

Principal Components

Name

Part A: Epoxide Resin
Metallic Silver
Part B: Aliphatic Amines
Metallic Silver

CAS Number

28768-32-3 + 17557-23-3
7440-22-4
68082-29-1, 112-24-3, 68541-13-9, 4246-51-9
7440-22-4

Properties of Cured 8331S

<i>Physical Properties</i>	<i>Method</i>	<i>Value</i> ^{a)}
Color	Visual	Silver Grey
Density @25 °C [77 °C]	ASTM D 1475	2.19 g/mL
Hardness	Shore D durometer	73D
Tensile Strength	ASTM D 638	14 N/mm ² [2 000 lb/in ²]
Elongation	"	5.3%
Young's Modulus	"	760 MPa
Lap Shear Strength (Stainless Steel 304)	ASTM D 1002	1.1 N/mm ² [160 lb/in ²]
Lap Shear Strength (Aluminum 5052)	ASTM D 1002	4.8 N/mm ² [690 lb/in ²]
Compressive Strength	ASTM D 695	65 N/mm ² [9 400 lb/in ²]
Solderable		No
Outgassing (Total Mass Loss) @24 h	ASTM E 595	0.43%
Water vapor release	"	0.27%
Collectable Volatile Condensable Material	"	0.04%
Water absorption		0.12%
<i>Electric Properties</i> ^{b)}	<i>Method</i>	<i>Value</i>
Volume Resistivity After 65 °C [149 °F] cure	Method 5011.5 in MIL-STD-883H	0.0060 Ω·cm
Surface Resistance After 25 °C [149 °F] cure after 96 h	Square Probe	~0.35 Ω/sq
After 65 °C [149 °F] cure after 1 h	Square Probe	0.25–0.40 Ω/sq
After 80 °C [176 °F] cure	Square Probe	0.15–0.20 Ω/sq
After 100 °C [212 °F] cure	Square Probe	0.11–0.15 Ω/sq



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<i>Thermal Properties</i>	<i>Method</i>	<i>Value</i>
Thermal Conductivity @25 °C [77 °F]	ASTM E 1461	0.850 W/(m·K)
@50 °C [122 °F]	"	0.826 W/(m·K)
@100 °C [212 °F]	"	0.961 W/(m·K)
Glass Transition Temperature (T _g)	ASTM D 3418	34 °C [93 °F]
CTE ^{c)} prior T _g	ASTM E 831	78 ppm/°C
CTE ^{c)} after T _g	ASTM E 831	158 ppm/°C
Specific Heat @25 °C [77 °F]		0.904 J/(g·K)

Note: Specifications are for epoxy samples that were cured at 80 °C for 60 minutes. 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/mm² = mPa; lb/in² = psi
- b) 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.
- c) Coefficient of Thermal Expansion (CTE) units are in ppm/°C = in/in/°C × 10⁻⁶ = unit/unit/°C × 10⁻⁶

Properties of Uncured 8331S

<i>Physical Property</i>	<i>Mixture (1A:1B)</i>	
Color	Silver Grey	
Density ^{a)}	2.49 g/mL	
Mix Ratio by volume (A:B)	1.0:1.0	
Mix Ratio by weight (A:B)	1.17:1.0	
Solids Content (w/w)	100%	
<i>Physical Property</i>	<i>Part A</i>	<i>Part B</i>
Color	Silver Grey	Silver Grey
Density	2.55 g/mL	2.38 g/mL
Flash Point	>127 °C [261 °F]	>93 °C [200 °F]
Resistivity of uncured material	Off-scale (no reading)	Off-scale (no reading)

a) Calculated value based on measures densities of each part

Extrusion Rate

The extrusion rate for a ¼" nozzle for each adhesive parts with respect to pressure are given below. For extrusion rates with respect to other nozzle diameters, contact us at support@mgchemicals.com.

8331S Extrusion Rates for Part A and B


<i>Pressure</i> lb/in ²	<i>Rate Part A</i> g/min	<i>Rate Part B</i> g/min
40	521	44
50	628	86
60	731	128
70	832	170
80	931	211
90	1027	223

Note: Nozzle diameter = 1/4"

Compatibility

Adhesion—As seen in the substrate adhesion table, the 8331S 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

<i>Physical Properties</i>	<i>Adhesion</i>
Steel	
Aluminum	
Fiberglass	
Wood	
Paper, Fiber	
Glass	
Rubber	
Polycarbonate	
Acrylic	
Polypropylene ^{a)}	
	Stronger
	Weaker

a) Does not bond to polypropylene

Storage

Store between 22 and 27 °C [72 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 8331S **Safety Data Sheet** (SDS) parts A and B for more details on transportation, storage, handling and other security guidelines.

Health and Safety: The 8331S 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.

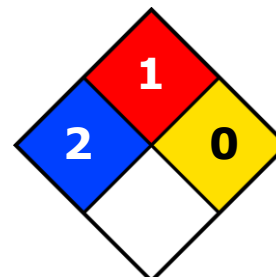
The cured epoxy resin presents no known hazard.

Part A

HMIS® RATING

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

NFPA® 704 CODES



Approximate HMIS and NFPA Risk Ratings Legend:

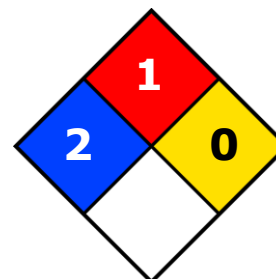
0 (Low or none); 1 (Slight); 2 (Moderate); 3 (Serious); 4 (Severe)

Part B

HMIS® RATING

HEALTH:	* 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)



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.

To heat cure the 8331S epoxy

Put in oven at 65 °C [149 °F] for 120 minutes. For optimum conductivity and faster cure, heat cure at temperatures up to 100 °C.

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 100 °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.

Packaging and Supporting Products

<i>Cat. No.</i>	<i>Packaging</i>	<i>Net Volume</i>		<i>Net Weight</i>		<i>Packaging Weight</i>	
8331S-15G	Syringe	6 mL	0.2 fl.oz	14.7 g	0.52 oz	400 g	0.9 lb
8331S-50ML	Jar	50 mL	1.69 fl oz	123 g	4.34 oz	2.0 kg	4.4 lb ¹⁾
8331S-200ML	Can	200 mL	6.76 fl oz	492 g	1.09 lb	0.6 kg	1.3 lb



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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

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.

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