

## Description

The 8329TCS *Slow Cure Thermal Conductive Adhesive* is an electronically insulating epoxy that combines long working time and high conductivity with ease of use. It has a convenient 1-to-1 mix ratio and 4 hours pot life. Due to this long pot life, the mixed adhesive essentially behaves like a 1-part adhesive for the duration of a work shift. However, unlike 1-part adhesives, it doesn't require temperatures as high as 130 and 170 °C, and it will cure at a more moderate 80 °C in less than 1 hour. The cured adhesive bonds very well to most substrates used in electronic assemblies; and resists thermal and mechanical shocks.

## Applications & Usages

The 8329TCS epoxy is used for thermal management situations requiring superior bonding strengths and good thermal transfers. For example, it is used to as a die-attach for electrical and electronics, increasing their long term reliability. It is great for heat sink bonding. It is also used as a high-powered LED adhesive that maximizes the lifetime of LEDs by dissipating their heat.

## Benefits and Features

- **Good low temperature alternative to 1-part TC adhesives with inconveniently high cure temperature**
- **Excellent 1.44 W/(m·K) thermal conductivity**
- **Easy 1:1 mix ratio**
- **Adheres to most electronic substrates**
- **Stores and ships at room temperature**—no freezing or dry ice required
- **Very long shelf life of at least three years**—even when stored at room temperature
- **Strong water and chemical resistance** to brine, acids, bases, and aliphatic hydrocarbons

### ENVIRONMENT

- ✓ RoHS
- ✓ REACH compliant

## Curing & Work Schedule

<i>Properties</i>	<i>Value</i>
Working Life <sup>a)</sup>	4 h
Shelf Life	≥3 y
Full Cure @25 °C [77 °F]	96 h
Full Cure @80 °C [176 °F]	1 h

a) Pot life at room temperature.

## Temperature Service Range

<i>Properties</i>	<i>Value</i>
Constant Service Temperature	-65 °C to 165 °C [-85 °F to 329 °F]
Maximum Withstand Temperature <sup>b)</sup>	-70 °C to 200 °C [-94 °F to 392 °F]
Storage Temperature of Unmixed Parts	22 °C to 27 °C [72 °F to 81 °F]

b) Withstand temperatures the temperature extremes that can be withstood for a short period of times.

## Properties of Cured 8329TCS


<i>Physical Properties</i>	<i>Method</i>	<i>Value</i> <sup>a)</sup>
Color	Visual	Dark Grey
Density @ 22 °C [71 °F]		2.17 g/cm <sup>3</sup>
Hardness	(Shore D durometer)	62D
Tensile Strength	ASTM D 638	11.4 N/mm <sup>2</sup> [1,650 lb/in <sup>2</sup> ]
Young's Modulus	"	314 N/mm <sup>2</sup> [45,500 lb/in <sup>2</sup> ]
Elongation	"	7.0%
Compression Strength	ASTM D 695	42.7 N/mm <sup>2</sup> [6,200 lb/in <sup>2</sup> ]
Lap Shear Strength (Aluminum 5052)	"	7.7 N/mm <sup>2</sup> [1,100 lb/in <sup>2</sup> ]
Water Absorption	ASTM D 570	0.23%
Outgassing (Total Mass Loss) @ 24 h	ASTM E 595	0.78%
Water Vapor Release (WVR)	"	0.13%
Collectable Volatile Condensable Material	"	0.07%
<b>Electric Properties</b>		
Breakdown Voltage @3.967 mm	ASTM D 149	26.3 kV
Dielectric Strength @3.967 mm	"	6.6 kV/mm [168 V/mil]
Breakdown Voltage @3.175 mm [1/8"]	Reference fit <sup>b)</sup>	23.9 kV
Dielectric Strength @3.175 mm [1/8"]		7.5 kV/mm [165 V/mil]
Volume Resistivity	ASTM D 257	2 x 10 <sup>13</sup> Ω·cm
Surface Resistivity	"	1 x 10 <sup>14</sup> Ω
Dielectric Dissipation & Constant		<i>dissipation, D</i> <i>constant, k'</i>
Dissipation & Constant @1 kHz	ASTM D 150-98	0.024     5.48
Insulating		Yes
Conductive		No
<b>Thermal Properties</b>		
Thermal Conductivity @25 °C	ASTM E 1461	1.44 W/(m·K)
Thermal Conductivity @50 °C	"	1.41 W/(m·K)
Thermal Conductivity @100 °C	"	1.27 W/(m·K)
Heat Deflection Temperature	ASTM D 648	30 °C [86 °F]
Glass Transition Temperature (T <sub>g</sub> )	ASTM D 3418	20 °C [68 °F]
CTE <sup>b)</sup> Prior T <sub>g</sub>	ASTM E 831	53 ppm/°C
CTE <sup>b)</sup> After T <sub>g</sub>	ASTM E 831	137 ppm/°C
Specific Heat @25 °C [77 °F]		0.922 J/(g·K)

*Note:* Specifications are for epoxy samples that were cured at 23 °C for 75 minutes. Samples were conditioned at 23 °C and 50% RH prior to most tests.

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

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

## Properties of Uncured 8329TCS

<i>Physical Property</i>	<i>Mixture (1A:1B)</i>	
Color	Dark Grey	
Density <sup>a)</sup>	2.32 g/mL	
Mix Ratio by Volume (A:B)	1:00:1.00	
Mix Ratio by Weight (A:B)	0.95:1.00	
Solids Content (w/w)	100%	
		
<i>Physical Property</i>	<i>Part A</i>	<i>Part B</i>
Color	Dark Grey	Medium Grey
Density	2.41 g/mL	2.83 g/mL
Flash Point	>149 °C [300 °F]	>148 °C [298 °F]
Viscosity	8,800,000 cP [8,800 Pa·s]	780,000 cP [780 Pa·s]

a) Calculated value based on measures densities of each part

b) Brookfield viscometer at 2.5 rpm for part A and 0.6 rpm for part B with spindle 7

## Principal Components

<b>Name</b>	<b>CAS Number</b>
Part A: Aluminum Oxide	1344-28-1
Zinc Oxide	1314-13-2
4,4'-Methylenebis[N,N-bis(2-oxiranylmethyl)aniline]	28768-32-3
Epoxy Phenol Novalac Resin	28064-14-4
Boron Nitride	110043-11-5
Part B: Aluminum Oxide	1344-28-1
Zinc Oxide	1314-13-2
Fatty acids, C18-unsatd., dimer, polymers	68541-13-9+68082-29-1
Boron Nitride	110043-11-5

## Compatibility

**Chemical**—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.

**Adhesion**—As seen in the substrate adhesion table, the 8329TCS epoxy adheres to many materials found on printed circuit assemblies; however, contaminants like water, oil, and greasy flux residues may affect adhesion. If contamination is present, clean the printed circuit assembly with electronic cleaner such as MG Chemicals 4050 Safety Wash, 406B Superwash, or 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.




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## Substrate Adhesion in Decreasing Order

<i>Physical Properties</i>	<i>Adhesion</i>
Steel	<p>Stronger</p>  <p>Weaker</p>
Aluminum	
Copper/Bronze	
Fiberglass	
Wood	
Paper, Fiber	
Glass	
Rubber	
Acrylic	
Polycarbonate	
Polypropylene <sup>a)</sup>	
Teflon <sup>a)</sup>	

a) Does not bond to polypropylene or teflon

## Storage

Store between 22 and 27 °C [72 and 81 °F] in dry area away from sunlight. Always recap firmly when not in use to maximize shelf life.

## Health, Safety, and Environmental Awareness

Please see the 8329TCS **Material Safety Data Sheet** (MSDS) parts A and B for more details on transportation, storage, handling and other security guidelines.

**Health and Safety:** The 8329TCS parts can ignite if the liquid is both heated and exposed to flames.

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

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

The uncured product contains unbound marine pollutants. Dispose of material according to local, regional, national, and international regulation. The cured product is not expected to be environmentally hazardous.

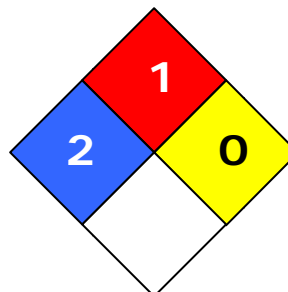
The cured epoxy adhesive presents no known hazard.

## Part A

### HMIS® RATING

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

### NFPA® 704 CODES

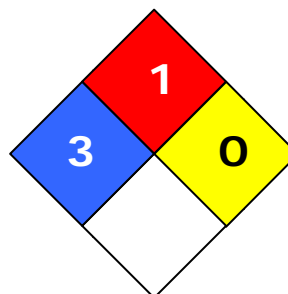


## Part B

### 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 cap or cover.
2. Measure *one* part by volume of *A*.
3. Measure *one* part by volume of *B*.
4. Thoroughly mix the parts together with a stir stick until homogeneous.
5. Apply to with an appropriate sized stick for the application area.

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

**TIP:** Note that the material viscosity decreases with mixing, so stirring the material before use will ease application to the substrate.



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## To heat cure the 8329TCS epoxy

Put in oven at 80 °C [176 °F] for 60 minutes.

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

**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 8329TCS epoxy

Let stand for 96 hours.

**TIP:** While the product can be cured at room temperature, the better conductive performance is achieved with heat curing.

## Packaging and Supporting Products

### Product Availability

<i>Cat. No.</i>	<i>Form</i>	<i>Net Volume</i>		<i>Net Weight</i>		<i>Shipping Weight</i>	
<b>8329TCS-6ML</b>	Paste	6 mL	0.20 fl oz	14 g	0.45 oz	36 g	1.2 oz

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

Email: [support@mgchemicals.com](mailto:support@mgchemicals.com)

Phone: 1-800-340-0772 Ext. 30 (Canada, Mexico & USA)

1-905-331-1396 Ext. 30 (International)

Fax: 1-905-331-2862 or 1-800-340-0773



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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

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