

Slow Cure Thermal Conductive Epoxy Adhesive 8329TCS Technical Data Sheet

8329TCS

Description

This is a two-part, smooth, dark grey paste that cures to form a hard, durable polymer that is extremely thermally conductive, yet electrically insulating. It is very viscous because it is highly filled with thermally conductive ceramic powders for maximum thermal conductivity. It bonds well to metals, ceramics, glass, and most plastics used in electronic assemblies.

It has a convenient 1-to-1 mix ratio and a 4 hour working life. The mixed adhesive can essentially act like a one-part adhesive for the duration of a work shift. Unlike one-part adhesives, it does not require high curing temperatures or frozen storage, and it has a very long shelf life.

This product comes packaged in separate 3 mL graduated syringes that can be accurately dispensed, or in 50 mL or 200 mL kits packaged in jars.

Applications & Usages

This product is designed to bond heat sinks, LED's, and other heat generating components in electronic assemblies. It is suitable for the manufacturing, repair, and hobbyist sectors. Use it when a thixotropic adhesive paste with maximum thermal conductivity and a very long working life is required. For automatic dispensing applications, use the 8329TFS, which has a lower viscosity at the cost of slightly lower thermal conductivity.

Benefits and Features

- **Thermal conductivity: 1.44 W/(m·K)**
- **1:1 mix ratio**
- **Working life: 4 hours**
- **Cure time 1 hour at 80°C or 96 hours at room temperature**
- **Room temperature storage**
- **Good adhesive strength**
- **Strong resistance to water, brine, acids, bases, and aliphatic hydrocarbons**
- **Shelf life greater than two years**

ENVIRONMENT

- ✓ RoHS
- ✓ REACH compliant

ATTENTION! Forms non-reworkable permanent bonds.

Usage Parameters

Properties	Value
Working Life ^{a)}	4 h
Shelf Life	≥2 y
Full Cure @25 °C [77 °F]	96 h
Full Cure @80 °C [176 °F]	1 h

a) Working life at room temperature.

Temperature Ranges

Properties	Value
Constant Service Temperature	-65 to 165 °C [-85 to 329 °F]
Intermittent Temp. Extrema ^{b)}	-70 to 200 °C [-40 to 302 °F]
Storage Temperature of Unmixed Parts	22 to 27 °C [72 to 81 °F]

b) The temperature extremes that can be withstood for a short period of times.

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Properties of Cured 8329TCS

Physical Properties	Method	Value ^{a)}
Color	Visual	Dark Grey
Density @22 °C [71 °F]	ASTM D 1475	2.17 g/mL
Hardness	Shore D durometer	62D
Tensile Strength	ASTM D 638	11.4 N/mm ² [1 650 lb/in ²]
Young's Modulus	"	310 N/mm ² [45 000 lb/in ²]
Elongation	"	7.0%
Compressive Strength	ASTM D 695	43 N/mm ² [6 200 lb/in ²]
Lap Shear Strength (Aluminum 5052)	"	7.7 N/mm ² [1 100 lb/in ²]
Water Absorption	ASTM D 570	0.23%
Outgassing (Total Mass Loss) @ 24 h	ASTM E 595	0.80%
Water Vapor Release (WVR)	"	0.13%
Collectable Volatile Condensable Material	"	0.07%
Electric Properties	Method	Value
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 ^{b)}	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 ¹³ Ω·cm
Dielectric Dissipation & Constant		dissipation, <i>D</i> constant, <i>k'</i>
Dissipation & Constant @1 kHz	ASTM D 150-98	0.024 5.48
Insulating		Yes
Conductive		No
Thermal Properties	Method	Value
Thermal Conductivity @25 °C [77 °F]	ASTM E 1461	1.44 W/(m·K)
@50 °C [122 °F]	"	1.41 W/(m·K)
@100 °C [212 °F]	"	1.27 W/(m·K)
Heat Deflection Temperature	ASTM D 648	30 °C [86 °F]
Glass Transition Temperature (T _g)	ASTM D 3418	20 °C [68 °F]
CTE ^{c)} Prior T _g	ASTM E 831	53 ppm/°C
CTE ^{c)} After T _g	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/mm² = MPa; lb/in² = psi

b) To allow comparison between products, the Tautscher equation was fitted to 3 experimental dielectric strengths and extrapolated to a standard reference thickness of 1/8" (3.175 mm).

c) Coefficient of Thermal Expansion (CTE) units are in ppm/°C = in/in/°C × 10⁻⁶ = unit/unit/°C × 10⁻⁶



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Properties of Uncured 8329TCS

<i>Physical Property</i>	<i>Mixture (1A:1B)</i>	
Color	Dark Grey	
Density ^{a)}	2.27 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	2.25 g/mL	2.28 g/mL
Flash Point	>149 °C [300 °F]	>148 °C [298 °F]

a) Calculated value based on measures densities of each part

Principal Components

Name	CAS Number
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 Novalak 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	Stronger  Weaker
Aluminum	
Copper/Bronze	
Fiberglass	
Wood	
Paper, Fiber	
Glass	
Rubber	
Acrylic	
Polycarbonate	
Polypropylene ^{a)}	
Teflon ^{a)}	

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 **Safety Data Sheet** (SDS) 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.

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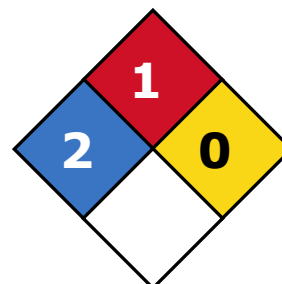
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Part A

HMIS® RATING

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

NFPA® 704 CODES

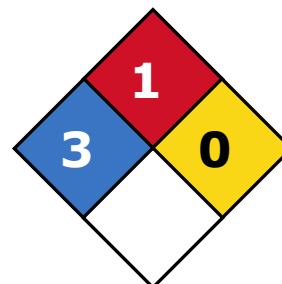


Part B

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

<i>Cat. No.</i>	<i>Packaging</i>	<i>Net Volume</i>		<i>Net Weight</i>		<i>Packaging Weight</i>	
8329TCS-6ML	Syringe	6 mL	0.20 fl oz	13.5 g	0.47 oz	400 g ^{a)}	0.9 lb ^{a)}
8329TCS-50ML	Jar	50 mL	1.6 fl oz	113 g	3.99 oz	1.5 kg ^{a)}	3.3 lb ^{a)}
8329TCS-200ML	Can	200 mL	6.7 fl oz	452 g	1.0 lb	250 g	0.6 lb

a) Pack of ten

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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