Slow Cure Thermally Conductive Adhesive, Flowable

multicomp PRO

RoHS Compliant

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 filled with thermally conductive ceramic powders for excellent 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 hours working life. With this long work life, the mixed adhesive can essentially act like a one-part adhesive for the duration of a work shift. Unlike one-part adhesives, however, it does not require high curing temperatures or frozen storage, and it has a very long shelf life.

This product comes packaged in a 25 mL manual dual syringe

Applications and Usages

The MC002977 epoxy is used for bonding heat sinks, LED's, and other heat generating components in electronic assemblies. It is suitable for use in manufacturing operations including automatic dispensing applications. It is also useful in maintenance, repair, and hobbyist sectors. Use it when a flowable adhesive with excellent thermal conductivity and a long working life is required.

Benefits and Features

- Thermal conductivity: 1.22 W/(m·K)
- 1:1 mix ratio by volume
- Working life of 4 hours
- Cure time of 1 hour 20 minutes at 80 °C or 96 hours at room temperature
- Good adhesive strength
- Strong water and chemical resistance to brine, acids, bases, and aliphatic hydrocarbons
- Suitable for automatic dispensing
- Stores and ships at room temperature

Usage Parameters

Properties	Value
Working Time [a)]	4 hour
Full Cure @ 25°C (77°F)	96 hour
Full Cure @ 65°C (149°F)	4 hour
Full Cure @ 80°C (176°F)	1 hour 20 min

[a)] Working time for 100 g and room temperature.

Temperature Ranges

Properties	Value
Constant Service Temperature	-40 to +165°C
	(-40°F to 329°F)
Intermittent Temp. Limits [b)]	-50 to +175°C
	(-58°F to +347°F)
Storage Temperature of Unmixed Parts	22°C to 27°C
	(72°F to 81°F)

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

Properties of Cured MC002977

Physical Properties	Method	Value [a)]	
Colour	Visual	Dark Grey	
Density	ASTM D 1475	2.08 g/cm3	
Hardness	Shore D durometer	68D	
Tensile Strength	ASTM D 638	4.2 N/mm^2	(600 lb/in^2)
Young's Modulus	ASTM D 638	0.028 GPa	(4100 lb/in^2)
Compression Strength	ASTM D 695	42 N/mm^2	(6000 lb/in^2)

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Physical Properties	Method	Value [a)]	
Lap Shear Strength (Stainless Steel)	ASTM D 1002	5.0 N/mm^2	(720 lb/in^2)
Lap Shear Strength (Aluminium)	ASTM D 1002	6.3 N/mm^2	(910 lb/in^2)
Lap Shear Strength (Copper)	ASTM D 1002	6.9 N/mm^2	(1000 lb/in^2)
Lap Shear Strength (Brass)	ASTM D 1002	6.4 N/mm^2	(930 lb/in^2)
Lap Shear Strength (ABS)	ASTM D 1002	1.5 N/mm^2	(220 lb/in^2)
Lap Shear Strength (Polycarbonate)	ASTM D 1002	1.8 N/mm^2	(260 lb/in^2)
Electric Properties	**Method**	**Value**	
Breakdown Voltage	ASTM D 149	19800V	
Dielectric Strength	ASTM D 149	220 V/mil	8.5kV/mm
Breakdown Voltage @ 3.175 mm (1/8”)	Reference fit [a)]	23300 V	
Dielectric Strength		186 V/mil	7.3 kV/mm
Volume Resistivity	ASTM D 257	1×10^{13} Ω × cm	
Dielectric Dissipation & Constant		dissipation, D constant, k’	
Dissipation & Constant	ASTM D 150-98	Not Applicable	Not Applicable
Insulating		Yes	
Conductive		No	
Thermal Properties	**Method**	**Value**	
Thermal Conductivity @ 25°C (77°F)	ASTM E 1461	1.22 W/(m*K)	
Thermal Conductivity @ 50°C (122°F)	ASTM E 1461	1.24 W/(m*K)	
Thermal Conductivity @ 100°C (212°F)	ASTM E 1461	1.14 W/(m*K)	
Thermal Diffusivity @ 25°C (77°F)	ASTM E 1461	0.58mm^2/S	
Specific Heat @ 25°C (77°F)	ASTM E 1461	1.01 J/(g*K)	
Specific Heat @ 50°C (122°F)	ASTM E 1461	1.16 J/(g*K)	
Specific Heat @ 100°C (212°F)	ASTM E 1461	1.24 J/(g*K)	
Glass Transition Temperature (T_g)	ASTM D 3418	9°C	
CTE [c)] Prior T_g	ASTM E 831	64 ppm/°C	
CTE [c)] After Tg	ASTM E 831	159 ppm/°C	

Note: Specifications are for epoxy samples that were cured at 80°C for 80 minutes. Additional curing time at room temperature was given to allow for optimum curing.

[a)] N/mm^2 = MPa; lb/in^2 = 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}

Properties of Uncured MC002977

Physical Property	Mixture (1A:1B)
Colour	Black
Density	2.07 g/mL
Mix Ratio by Volume (A:B)	1:1

Physical Property	Mixture (1A:1B)	
Mix Ratio by Weight (A:B)	1:0.96	
Solids Content (w/w)	100%	
Physical Properties	**Part A**	**Part B**
Colour	Black	Dark Grey
Density	2.23 g/mL	1.96 g/mL
Flash Point	>149°C (300°F)	>43°C (109°F)
Viscosity	Thixotropic Paste	Thixotropic Paste

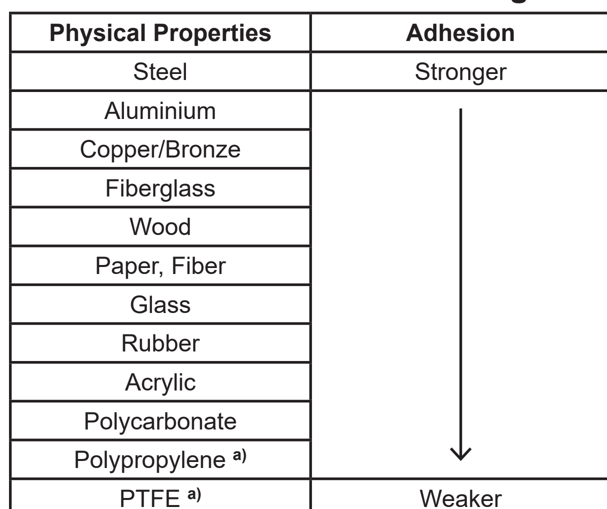
Compatibility

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 MC002977 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.

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

Substrate Adhesion in Decreasing Order



Physical Properties	Adhesion
Steel	Stronger
Aluminium	↓
Copper/Bronze	
Fiberglass	
Wood	
Paper, Fiber	
Glass	
Rubber	
Acrylic	
Polycarbonate	
Polypropylene [a]	
PTFE [a]	Weaker

[a] Does not bond to polypropylene or PTFE

Storage

Store between 22 and 45°C (72 and 113°F) in dry area away from sunlight. Because some of the components are sensitive to air, always recap firmly when not in use to maximize shelf life.

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 by volume

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: You may preheat part A and part B to increase the flow and improve air release, but this will decrease pot life. Note that the viscosities of the parts also decreases with mixing, so they will be most liquid-like and easily dispensed with constant mixing.

To heat cure the MC002977 epoxy

Put in oven at 80°C (176°F) for 80 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 MC002977 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

Packaging	Net Volume		Net Weight	
Dual Syringe	25mL	0.8 fl oz	52.5g	1.85 oz

Part Number Table

Description	Part Number
Slow Cure Thermally Conductive Adhesive, Flowable, 25mL, Dual Syringe	MC002977

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