

## High Temperature Rigid Urethane

### Description

8820 is a black, tough, high temperature, two-part polyurethane potting compound. It has a low mixed viscosity and properties similar to epoxy compounds, but with exceptional low temperature stability. As well, it adheres strongly to a wide variety of substrates, including metals, composites, glass, ceramics, and many plastics.

8820 offers exceptional physical protection, a high continuous operating temperature, and superior protection from acids, bases, and many organic solvents.

### Features and Benefits

- *2:1 mix ratio*
- *15 minute working life*
- *48 hour cure at room temperature*
- *Constant service temperature of -50 °C to 150 °C (-58 to 302 °F)*
- *Low exotherm*
- *Excellent dielectric properties*

### Usage Parameters

Properties	Value
Working life @22 °C [72 °F]	15 min
Shelf life	1 y
Full cure @22 °C [72 °F]	48 h
Full cure @65 °C [149 °F]	2 h
Full cure @80 °C [176 °F]	1.5 h

## Temperature Ranges

Properties	Value
Constant service temperature	-50 to 150 °C [-58 to 302 °F]
Maximum intermittent temperature <sup>a)</sup>	175 °C [266 °F]
Storage temperature	16 to 30 °C [61 to 86 °F]

**a)** Temperature that can be withstood for short periods without sustaining damage.

## Cured Properties

Physical Properties	Method	Value <sup>a)</sup>
Color	Visual	Black
Density @25 °C [77 °F]	ASTM D 1475	1.24 g/mL
Hardness	Shore D Durometer	73D
Tensile strength	ASTM D 638	38 N/mm <sup>2</sup> [5 500 lb/in <sup>2</sup> ]
Young's Modulus	ASTM D 638	2 600 N/mm <sup>2</sup> [370 000 lb/in <sup>2</sup> ]
Compressive strength	ASTM D 695	295 N/mm <sup>2</sup> [42 800 lb/in <sup>2</sup> ]
Lap shear strength (stainless steel)	ASTM D 1002	13 N/mm <sup>2</sup> [1 800 lb/in <sup>2</sup> ]
Lap shear strength (aluminum)	ASTM D 1002	13 N/mm <sup>2</sup> [1 800 lb/in <sup>2</sup> ]
Lap shear strength (copper)	ASTM D 1002	12 N/mm <sup>2</sup> [1 700 lb/in <sup>2</sup> ]
Lap shear strength (brass)	ASTM D 1002	7.8 N/mm <sup>2</sup> [1 100 lb/in <sup>2</sup> ]

*Note: Specifications are for samples cured at 65 °C for 1 h and conditioned at ambient temperature and humidity.*

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

## Cured Properties

Electrical Properties	Method	Value
Breakdown voltage @3.175 mm [1/8"]	Reference fit <sup>a)</sup>	47 300 V [47.3 kV]
Dielectric strength @3.175 mm [1/8"]	Reference fit <sup>a)</sup>	378 V/mil [14.9 kV/mm]
Volume resistivity	ASTM D 257	1.4 x 10 <sup>13</sup> Ω·cm
Volume conductivity	ASTM D 257	7.0 x 10 <sup>-14</sup> S/cm
Dielectric dissipation, D @1 MHz	ASTM D 150-11	TBD
Dielectric constant, k' @1 MHz	ASTM D 150-11	TBD
Thermal Properties	Method	Value
Glass transition temperature (T <sub>g</sub> )	ASTM E 831	44 °C [111 °F]
CTE <sup>b)</sup> prior T <sub>g</sub> after T <sub>g</sub>	ASTM E 831 ASTM E 831	94 ppm/°C [201 ppm/°F] 195 ppm/°C [382 ppm/°F]
Thermal conductivity @25 °C [77 °F]	ASTM E 1461 92	0.27 W/(m·K)
Thermal diffusivity @25 °C [77 °F]	ASTM E 1461 92	0.15 mm <sup>2</sup> /s
Specific heat capacity @25 °C [77 °F]	ASTM E 1269 01	1.44 J/(g·K)

*Note: Specifications are for samples cured at 65 °C for 1 h and conditioned at ambient temperature and humidity.*

**a)** To allow comparison between products, the dielectric strength was recalculated with the Tauscher equation fitted to 5 experimental values and extrapolated to a standard thickness of 1/8" (3.175 mm).

**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>

## Uncured Properties

Physical Properties	Mixture (A:B)
Color	Black
Mix ratio by volume	2:1
Mix ratio by weight	1.85:1

Physical Properties	Part A	Part B
Color	Black	Amber
Viscosity @25 °C [77 °F]	10 700 cP [10.7 Pa·s] <sup>a)</sup>	250 cP [0.25 Pa·s] <sup>b)</sup>
Density	1.15 g/mL	1.24 g/mL
Odor	None	None

**a)** Brookfield viscometer at 50 rpm with spindle LV S64

**b)** Brookfield viscometer at 100 rpm with spindle LV S62

## Compatibility

**Adhesion**—As seen in the substrate adhesion table, 8820 adheres to most plastics and metals used to house printed circuit assemblies; however, it is not compatible with contaminants like water, oil, or greasy flux residues that may affect adhesion. If contamination is present, first clean the surface to be coated with MG Chemicals 824 Isopropyl Alcohol.

## Storage

Store between 24 to 30 °C [75 to 85 °F] in a dry area, away from sunlight.

Minimize the time that the container is kept opened and purge with nitrogen before closing if the material is not used up at once.

## Health and Safety

Please see the 8820 Safety Data Sheet (SDS) parts A and B for further details on transportation, storage, handling, safety guidelines, and regulatory compliance.

## Substrate Adhesion (In Decreasing Order)

Physical Properties	Adhesion	
Steel	Stronger	
Copper		
Aluminum		
Fiberglass		
Wood		
Paper, Fiber		
Glass		
Rubber		
Acrylic		
Polycarbonate		Weaker
Polypropylene		Does not bond
Teflon™	Does not bond	

## Application Instructions

For best results, follow the procedure below.

### Manual mixing:

1. (Optional) Pre-heat part A to improve surface quality.
2. Scrape settled material free from the bottom and sides of the part A container; stir the contents until homogenous.
3. Measure 2 part by volume of the pre-stirred part A, and pour into the mixing container. Ensure all contents are transferred by scraping the container.
4. Measure 1 part by volume of the part B, and pour into the mixing container. Ensure all contents are transferred by scraping the container.
5. Thoroughly mix parts A and B together.
6. (Optional) Put in a vacuum chamber at 25 inHg.
7. Pour the mixture into a container holding the components to be protected.
8. Blanket both parts with nitrogen if the material is not used up to prevent moisture.
9. Close the part A and B containers tightly between uses.

### Attention!

*Mixing >500 g at a time decreases working life and can lead to a flash cure. Limit the size of hand-mixed batches. For large production volumes, contact MG Chemicals Technical Support for assistance.*

## Cure Instructions

### Room temperature cure:

- Let cure at room temperature for 48 h.

### Heat cure:

- Put in oven at 65 °C [149 °F] for 2 h.  
—OR—
- Put in oven at 80 °C [176 °F] for 1.5 h.

## Packaging and Supporting Products

Cat. No.	Packaging	Net Weight	Net Volume	Packaged Weight
8820-375ML	2 Bottle kit	440 g [15.5 oz]	375 mL [12.6 fl oz]	TBD
8820-2.55L	3 Can kit	3 kg [6.61 lb]	2.55 L [2.69 qt]	TBD
8820-10.8L	3 Can kit	12.7 kg [28 lb]	10.8 L [2.85 gal]	TBD
8820-60L	3 Pail kit	70.6 kg [155 lb]	60 L [15.8 gal]	TBD

TBD=To be determined

## Technical Support

Please contact us regarding any questions, suggestions for improvements, or problems with this product. Application notes, instructions and FAQs are located at [www.mgchemicals.com](http://www.mgchemicals.com).

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