Flame Retardant Structural Epoxy Adhesive

Description

9200FR is a toughened, flame retardant, two-part epoxy adhesive, designed to create long-lasting load-bearing joints. It adheres strongly to materials that are difficult to bond to, including glass, ceramics, metals, engineered thermoplastics, and thermoset laminates, such as SMC (sheet molding compound) and GRP (glass-reinforced plastics). It creates tough vibration-resistant bonds, and is especially useful for joining dissimilar materials that will experience thermal cycling stresses.

This product also provides excellent electrical insulation, and protects against static discharges, thermal shocks, galvanic corrosion, environmental humidity, salt water, fungus, and many harsh chemicals.

It is smooth, non-sagging and thixotropic, so it is excellent for use on vertical surfaces and for gap-filling. It is also useful for potting electronics in enclosures with gaps where a non-thixotropic encapsulant would flow through.

If flame retardance is not required, use 9200, which has superior mechanical properties.

Features and Benefits

- *1:1 mix ratio*
- *Flame retardant—meets UL 94V-0*
- *Excellent bond strength to a wide variety of substrates*
- *Extreme resistance to vibration and temperature cycling*
- *High tensile, compressive and lap shear strength*
- *Excellent chemical resistance*
- *Excellent electrical insulating characteristics*
- *Non-sagging and gap-filling*
- *Ideal for bonding dissimilar materials*
- *Low shrinkage*
- *RoHS 3 compliant*

Usage Parameters

Properties	Value
Working life @22 °C [72 °F]	30 min
Shelf life @22 °C [72 °F] a)	≥3 y
Service cure @22 °C [72 °F]	TBD
Full cure @22 °C [72 °F]	24 h
Full cure @40 °C [104 °F]	16 h
Full cure @65 °C [149 °F]	3 h
Full cure @80 °C [176 °F]	1.5 h

Temperature Ranges

Properties	Value
Constant service temperature	-40 to 150 °C [-40 to 302 °F]
Storage temperature	16 to 27 °C [61 to 81 °F]

Cured Properties

Physical Properties	Method	Value [a)]
Color	Visual	Light yellow
Density @25 °C [77 °F]	ASTM D 1475	1.29 g/mL
Hardness	Shore D Durometer	78D
Tensile strength	ASTM D 638	13 N/mm^2 [1 900 lb/in^2]
Compressive strength	ASTM D 695	46 N/mm^2 [6 700 lb/in^2]
Lap shear strength (stainless steel)	ASTM D 1002	14 N/mm^2 [1 900 lb/in^2]
Lap shear strength (aluminum)	ASTM D 1002	10 N/mm^2 [1 500 lb/in^2]
Lap shear strength (copper)	ASTM D 1002	12 N/mm^2 [1 800 lb/in^2]
Lap shear strength (brass)	ASTM D 1002	13 N/mm^2 [1 900 lb/in^2]
Lap shear strength (polycarbonate)	ASTM D 1002	2.3 N/mm^2 [340 lb/in^2]
Lap shear strength (ABS)	ASTM D 1002	0.7 N/mm^2 [100 lb/in^2]

Note: Specifications are for epoxy samples cured at 40 °C for 16 h and conditioned at ambient temperature and humidity.

a) N/mm^2 = mPa; lb/in^2 = psi

Cured Properties

Electrical Properties	Method	Value
Breakdown voltage @2.1 mm	ASTM D 149	39 800 V [39.8 kV]
Dielectric strength @2.1 mm	ASTM D 149	497 V/mil [19.6 kV/mm]
Breakdown voltage @3.175 mm [1/8"]	Reference fit [a)]	50 000 V [50 kV]
Dielectric strength @3.175 mm [1/8"]	Reference fit [a)]	400 V/mil [15.7 kV/mm]
Volume resistivity	ASTM D 257	1.1 x 10^{13} Ω·cm
Volume conductivity	ASTM D 257	9.1 x 10^{-14} S/cm
Thermal Properties	**Method**	**Value**
Glass transition temperature (T_g)	ASTM E 3418	59 °C [138 °F]
CTE [b)] prior T_g after T_g	ASTM E 831 ASTM E 831	79 ppm/°C [174 ppm/°F] 126 ppm/°C [259 ppm/°F]
Thermal conductivity @25 °C [77 °F]	ASTM E 1461 92	0.4 W/(m·K)
Thermal diffusivity @25 °C [77 °F]	ASTM E 1461 92	0.2 mm^2/s
Specific heat capacity @25 °C [77 °F]	ASTM E 1461 92	1.5 J/(g·K)

Note: Specifications are for epoxy samples cured at 40 °C for 16 h and conditioned at ambient temperature and humidity.

a) To allow comparison between products, the dielectric strength was recalculated with the Tautscher 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^{-6} = unit/unit/°C × 10^{-6}

Uncured Properties

Physical Properties	Mixture (A:B)
Color	Light yellow
Density	1.25 g/mL
Mix ratio by volume	1:1
Mix ratio by weight	1:0.92

Physical Properties	Part A	Part B
Color	Off-white	Light yellow
Viscosity @25 °C [77 °F]	380 000 cP [380 Pa·s] a)	370 000 cP [370 Pa·s] a)
Density	1.30 g/mL	1.27 g/mL
Odor	Mild	Ammonia-like

a) Brookfield viscometer at 20 rpm with spindle RV S96

Compatibility

Adhesion—9200FR epoxy 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, which may affect adhesion. In case of contamination, first clean the surface to be coated with MG Chemicals 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.

Chemical resistance—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.

Storage

Store between 16 to 27 °C [61 to 81 °F] in a dry area, away from sunlight. Some of the components are sensitive to air, always recap firmly when not in use to maximize shelf life.

Substrate Adhesion (In Decreasing Order)

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

Health and Safety

Please see the 9200FR Safety Data Sheet (SDS) parts A and B for further details on transportation, storage, handling, safety guidelines, and regulatory compliance.

Application Instructions

For best results, follow the procedure below. Heat cure to achieve optimal conductivity.

Syringe or cartridge:

To insert the cartridge in the gun, see the Application Guide section for dispensing accessories.

1. Twist and remove the cap from the cartridge or syringe. Do not discard cap.
2. Dispense a small amount to ensure even flow of both parts.
3. (Optional) Attach a static mixer to the 9200FR-50ML.
   a. Dispense and discard 3 to 5 mL of the product to ensure a homogeneous mixture.
   b. After use, dispose of static mixer.
4. Without a static mixer, dispense material on a mixing surface or container, and thoroughly mix parts A and B together.
5. To stop the flow, pull back on the plunger.
6. Clean nozzle to prevent contamination and material buildup.
7. Replace the cap on the cartridge or syringe.

Cure Instructions

Room temperature cure:

- Let cure at room temperature for 24 h.

Heat cure:

- Put in oven at 40 °C [104 °F] for 16 h.
  —OR—
- Put in oven at 65 °C [149 °F] for 3 h.
  —OR—
- Put in oven at 80 °C [176 °F] for 1.5 h.

Dispensing Accessories

Consult the table below for appropriate accessory selection. See the Application Guide for instructions on using the dispensing accessories.

Cat. No.	Dispensing Gun	Static Mixer
9200FR-25ML	N/A	N/A
9200FR-50ML	8DG-50-1-1	8MT-50, 8MT-50FT

Packaging and Supporting Products

Cat. No.	Packaging	Net Volume	Packaged Weight
9200FR-25ML	Dual syringe	25 mL [0.84 fl oz]	88 g [0.19 lb]
9200FR-50ML	Dual cartridge	45 mL [1.52 fl oz]	112 g [0.25 lb]

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.

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Disclaimer

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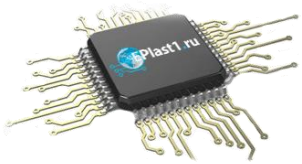

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