



# Technical Data Sheet

## 3M™ Scotch-Weld™ Epoxy Potting Compound/Adhesive DP270 Black



[Product Details](#)



[Regulatory Info/SDS](#)

### Product Description

3M™ Scotch-Weld™ Epoxy Potting Compound/Adhesive DP270 (or 3M™ Scotch-Weld™ Epoxy Potting Compound/Adhesive 270 B/A) is a two-part, low viscosity epoxy resin system designed primarily for potting, sealing, and encapsulation of many electronic components and is available in clear or black. Scotch-Weld epoxy potting compound/adhesive DP270 is noncorrosive to copper and offers good thermal shock resistance and excellent retention of electrical insulation properties under high humidity conditions.

3M™ Scotch-Weld™ epoxy potting compound/adhesive DP270 has a work life of approximately 70 minutes, a tack-free time of about 3 hours and is fully cured after 48 hours at 73°F (23°C). This product produces no exotherm in 5-10 gram masses and a very slight exotherm in larger masses.

3M™ Scotch-Weld™ epoxy potting compound/adhesive DP270 is ideal for the potting and encapsulation of many heat sensitive or delicate components such as glass diodes and sensors as well as for transformers, coils, chokes, relays, etc. It is available in the convenient 3M™ EPX™ Applicator System for multi-station usage and in bulk containers for larger volume applications.

Available in bulk containers as Scotch-Weld epoxy potting compound/adhesive 270 B/A.

### Product Features

- Good Thermal Shock Resistance
- Excellent Electrical Properties
- Meets UL 94 HB (File No. E61941)
- Noncorrosive to Copper
- Long Worklife
- Negligible Exotherm

### Technical Information Note

The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

### Typical Uncured Physical Properties

Attribute Name	Value
Mix Ratio by Weight (B:A)	1:0.85
Mix Ratio by Volume (B:A)	1:1

Attribute Name	Temperature	Value
Base Color		Black
Accelerator Color		Amber
Base Resin		Epoxy
Accelerator Resin		Amine
Base Viscosity	22 °C (72 °F)	7000 — 16000 cP
Accelerator Viscosity	22 °C (72 °F)	6000 — 12000 cP

### Typical Mixed Physical Properties

Attribute Name	Temperature	Value
Cure Shrinkage		0.08 %
Worklife	22 °C (72 °F)	60 — 70 min
Open Time		60 min <sup>1</sup>
Tack Free Time	22 °C (72 °F)	3 h

Attribute Name	Temperature	Value
Time to Handling Strength	22 °C (72 °F)	3 h <sup>2</sup>
Time to Full Cure	22 °C (72 °F)	48 h <sup>3</sup>

<sup>1</sup> Max time allowed after applying adhesive to a substrate before bond must be closed and fixed. Cure times approximate and depend on adhesive temperature. Hotmelts: The approx. bonding range of a 1/8" bead of molten adhesive on a non-metallic surface.

<sup>2</sup> Minimum time required to achieve 50 psi of overlap shear strength. Cure times are approximate and depend on adhesive temperature.

<sup>3</sup> The cure time is defined as that time required for the adhesive to achieve a minimum of 80% of the ultimate strength as measured by aluminum-aluminum OLS.

## Typical Physical Properties

Attribute Name	Value
Cured Color	Black

## Typical Cured Characteristics

Attribute Name	Test Method	Temperature	Value
Compression Strength	ASTM D695	22 °C (72 °F)	8,100 lb/in <sup>2</sup> <sup>1</sup>
Shore D Hardness	ASTM D2240	22 °C (72 °F)	83 <sup>2</sup>
Weight Loss by Thermal Gravimetric Analysis (TGA)		122 °C (252 °F)	1 %
Weight Loss by Thermal Gravimetric Analysis (TGA)		175 °C (347 °F)	5 %
Weight Loss by Thermal Gravimetric Analysis (TGA)		210 °C (410 °F)	10 %

<sup>1</sup> 3M™ Scotch-Weld™ Epoxy Potting Compound/Adhesive DP270 and 270 B/A can be used for, potting, encapsulation, and adhesive applications.

<sup>2</sup> Tensile and Elongation. Samples were 51 mm (2") dumbbells with 3 mm (0.125") neck and 0.8 mm (0.03" sample thickness. Separation rate was 51 mm/min (2"/min)

Test Condition: Potted Washer Olyphant Test, 100°C [air] ~ -50°C [liquid]

Attribute Name	Test Method	Value
Thermal Shock Resistance	3M C3174	Pass 5 Cycles without cracking

## Typical Performance Characteristics

### Overlap Shear Strength

Surface Prep: MEK Wipe

Temperature: 22 °C (72 °F)

Dwell Time: 7 d

Test Method: ASTM D1002, ISO 4587

Substrate	Value
Copper	1700 — 1750 lb/in <sup>2</sup> <sup>1</sup>
FR-4	1750 — 1800 lb/in <sup>2</sup> <sup>1</sup>

<sup>1</sup> 3M™ Scotch-Weld™ Epoxy Potting Compound/Adhesive DP270 and 270 B/A can be used for, potting, encapsulation, and adhesive applications. The following shows typical shear and peel values determined on several common substrates. 0.005-0.008in bondline

Substrate: Aluminum to Etched Aluminum

Temperature: 22 °C (72 °F)

Attribute Name	Test Method	Value
T-Peel Adhesion	ASTM D1876	>2 lb/in width <sup>1</sup>

<sup>1</sup> 3M™ Scotch-Weld™ Epoxy Potting Compound/Adhesive DP270 and 270 B/A can be used for, potting, encapsulation, and adhesive applications.

## Typical Environmental Performance

### Solvent Resistance

Environmental Condition	Value
24hr @ RT + 2hr @ 71°C (160°F) + Isopropyl Alcohol 1hr	A <sup>1</sup>
24hr @ RT + 2hr @ 71°C (160°F) + Acetone 1hr	B <sup>1</sup>
24hr @ RT + 2hr @ 71°C (160°F) + 1, 1, 1 - Trichloroethane 1hr	A <sup>1</sup>
24hr @ RT + 2hr @ 71°C (160°F) + Freon TF 1hr	A <sup>1</sup>
24hr @ RT + 2hr @ 71°C (160°F) + Freon TMC 1hr	B <sup>1</sup>
24hr @ RT + 2hr @ 71°C (160°F) + RMA Flux 1hr	A <sup>1</sup>
24hr @ RT + 2hr @ 71°C (160°F) + Isopropyl Alcohol 1mo	B <sup>1</sup>
24hr @ RT + 2hr @ 71°C (160°F) + Acetone 1mo	C <sup>1</sup>
24hr @ RT + 2hr @ 71°C (160°F) + 1, 1, 1 - Trichloroethane 1mo	C <sup>1</sup>
24hr @ RT + 2hr @ 71°C (160°F) + Freon TF 1mo	A <sup>1</sup>
24hr @ RT + 2hr @ 71°C (160°F) + Freon TMC 1mo	C <sup>1</sup>
24hr @ RT + 2hr @ 71°C (160°F) + RMA Flux 1mo	B <sup>1</sup>

<sup>1</sup> Cured OLS samples immersed in solvent and after dwell, examined for surface attack compared to control.

A: Unaffected, no color or texture change

B: Slight attack, slight swelling of surface.

C: Moderate/severe attack, extreme swelling of surface.

### Electrical and Thermal Properties

Attribute Name	Test Method	Temperature	Test Condition	Value
Glass Transition Temperature (Tg)			Onset	43 °C (109 °F) <sup>1</sup>
Glass Transition Temperature (Tg)			Mid-Point	49 °C (120 °F) <sup>1</sup>
Coefficient of Thermal Expansion			Below Tg (5°C to 30°C)	80 x 10 <sup>-6</sup> m/m/°C
Coefficient of Thermal Expansion			Above Tg (60°C to 125°C)	180 x 10 <sup>-6</sup> m/m/°C
Thermal Conductivity	C177	110 °F		0.178 W/m/K (4.25 x 10 <sup>-4</sup> Cal/s/cm/°C) (0.103 (btu-ft)/(h-ft <sup>2</sup> -°F)) <sup>2</sup>

<sup>1</sup> Glass Transition Temperature (Tg) determined using DSC Analyzer with a heating rate of 68°F (20°C) per minute. Second heat values given.

<sup>2</sup> Thermal conductivity determined using C-matic Instrument using 2 in. diameter samples.

Attribute Name	Test Method	Temperature	Test Condition	Value
Dielectric Constant	ASTM D150	22 °C (72 °F)	1 KHz	3.5
Dissipation Factor	ASTM D150	22 °C (72 °F)	1 KHz	0.018
Insulation Resistance			1000 hrs	2 x 10 <sup>11</sup> Ω <sup>1</sup>
Insulation Resistance			Initial	3 x 10 <sup>13</sup> Ω <sup>1</sup>
Volume Resistivity	ASTM D257	22 °C (72 °F)		4.1 x 10 <sup>14</sup> Ω-cm

<sup>1</sup> 0.8 mm/0.8 mm comb pattern on FR-4, 60°C/96% R.H./100 volts d.c.

## **3M™ EPX™ Pneumatic Applicator Delivery Rates**

### **Pneumatic Applicator Delivery Rates**

<b>Test Condition</b>	<b>Value</b>
200 ml Applicator - Maximum Pressure 58 psi. 6mm Nozzle	38.2 g/min <sup>1</sup>
200 ml Applicator - Maximum Pressure 58 psi. 10mm Nozzle	148.8 g/min <sup>1</sup>
48.5/50 ml Applicator - Maximum Pressure 50 psi. 1/4 in. Nozzle	68.6 g/min <sup>1</sup>

<sup>1</sup> Tests were run at a temperature of 70°F ± 2°F (21°C ± 1°C) and at maximum applicator pressure.

### **Handling/Application Information**

#### **Directions for Use**

1. For high strength structural bonds, paint, oxide films, oils, dust, mold release agents and all other surface contaminants must be completely removed. However, the amount of surface preparation directly depends on the required bond strength and the environmental aging resistance desired by user. For specific surface preparations on common substrates, see the section on surface preparation.

2. These products consist of two parts.

Mixing

For Duo-Pak Cartridges

3M™ Scotch-Weld™ epoxy potting compound/adhesive DP270 Clear and Black are supplied in a dual syringe plastic duo-pak cartridge as part of the 3M™ EPX™ Applicator systems. To use, simply insert the duo-pak cartridge into the EPX applicator and start the plunger into the cylinders using light pressure on the trigger. Next, remove the duo-pak cartridge cap and expel a small amount of adhesive to be sure both sides of the duo-pak cartridge are flowing evenly and freely. If mixing of Part A and Part B is desired, attach the EPX applicator mixing nozzle to the duo-pak cartridge and begin dispensing the adhesive. For hand mixing, expel the desired amount of material and mix thoroughly to obtain a uniform color.

For Bulk Containers

Mix thoroughly by weight or volume in the proportions specified in the typical uncured properties section to obtain a uniform color.

3. For maximum bond strength apply product evenly to both surfaces to be joined.

4. Application to the substrates should be made within 70 minutes. Larger quantities and/or higher temperatures will reduce this working time.

5. Join the adhesive coated surfaces and allow to cure at 60°F (16°C) or above until firm. Heat up to 200°F (93°C) will speed curing.

6. The following times and temperatures will result in a full cure of these products.

23°C (73°F) 48 Hours

50°C (122°F) 4 Hours

80°C (176°F) 60 Minutes

100°C (212°F) 30 Minutes

7. Keep parts from moving during cure. Contact pressure necessary. Maximum shear strength is obtained with a 3-5 mil bond line.

8. Excess uncured adhesive can be cleaned up with ketone type solvents\*.

\*Note: When using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer's precautions and directions for use.

**Adhesion Coverage:**A 0.005 in thick bondline will yield a coverage of 320 sqft/gallon

## Surface Preparation

For high strength structural bonds, paint, oxide films, oils, dust, mold release agents and all other surface contaminants must be completely removed. However, the amount of surface preparation directly depends on the required bond strength and the environmental aging resistance desired by user.

### The following cleaning methods are suggested for common surfaces:

#### Steel

1. Wipe free of dust with oil-free solvent such as acetone, isopropyl or alcohol solvents.\*
2. Sandblast or abrade using clean fine grit abrasives.
3. Wipe again with solvent to remove loose particles.
4. If a primer is used, it should be applied within 4 hours after surface preparation.

#### Aluminum

1. Alkaline Degrease: Oakite 164 solution (9-11 oz./gallon water) at 190°F ± 10°F (88°C ± 5°C) for 10-20 minutes. Rinse immediately in large quantities of cold running water.
2. Acid Etch: Place panels in the following solution for 10 minutes at 150°F ± 5°F (66°C ± 2°C).  
Sodium Dichromate 4.1 - 4.9 oz./gallon  
Sulfuric Acid, 66°Be 38.5 - 41.5 oz./gallon 2024-T3 aluminum (dissolved) 0.2 oz./gallon minimum Tap water as needed to balance
3. Rinse: Rinse panels in clear running tap water.
4. Dry: Air dry 15 minutes; force dry 10 minutes at 150°F ± 10°F (66°C ± 5°C).
5. If primer is to be used, it should be applied within 4 hours after surface preparation.

#### Plastics/Rubber

1. Wipe with isopropyl alcohol.\*
2. Abrade using fine grit abrasives.
3. Wipe with isopropyl alcohol.\*

#### Glass

1. Solvent wipe surface using acetone or MEK.\*
2. Apply a thin coating (0.0001 in. or less) of 3M™ Scotch-Weld™ Metal Primer EC3901 to the glass surfaces to be bonded and allow the primer to dry 60 minutes before bonding.

\*Note: When using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer's precautions and directions for use.

## Application Equipment

These products may be applied by spatula, trowel or flow equipment.

Two part mixing/proportioning/dispensing equipment is available for intermittent or production line use. These systems are ideal because of their variable shot size and flow rate characteristics and are adaptable to most applications.

## Industry Specifications

UL 94 HB (File E61941)

## Storage and Shelf Life

Store under normal conditions of 16° to 27°C (60° to 80°F) in the original, unopened packaging, out of direct sunlight. For best performance, use this product within 12 months from date of manufacture.

## Precautionary Information

Refer to Product Label and Material Safety Data Sheet for health and safety information before using this product. For additional health and safety information, call 1-800-364-3577

## Automotive Disclaimer

### Select Automotive Applications:

This product is an industrial product and has not been designed or tested for use in certain automotive applications, such as automotive electric powertrain battery or high voltage applications, which may require the product to be manufactured in a IATF certified facility, meet a Ppk of 1.33 for all properties, undergo an automotive production part approval process (PPAP), or fully adhere to automotive design or quality system requirements (e.g., IATF 16949 or VDA 6.3). Customer assumes all responsibility and risk if customer chooses to use this product in these applications.

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## **ISO Statement**

This product was manufactured under a 3M quality system registered to ISO 9001 standards.

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