



Technical Data Sheet

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



Additional Info



Regulatory
Info/SDS

Product Description

3M™ Scotch-Weld™ Epoxy Potting Compound/Adhesive DP270 Black (or 3M™ Scotch-Weld™ Epoxy Potting Compound/Adhesive 270 B/A Black) is a two-part, low viscosity epoxy resin system designed primarily for potting, sealing, and encapsulation of many electronic components. Product is available in Black or Clear (3M™ Scotch-Weld™ Epoxy Potting Compound/Adhesive DP270 Clear).

Product Features

- Good Thermal Shock Resistance
- Excellent Electrical Properties
- Meets UL 94 HB (File No. E61941)
- 70-Minute 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.

Note: The following data is taken from tests conducted on limited production runs. 3M will continue to test samples from additional product runs and will issue a new data page if the test results change.

Typical Uncured Physical Properties

Attribute Name	Value
Mix Ratio by Weight (B:A)	1:1.06
Mix Ratio by Volume (B:A)	1:1

Attribute Name	Value
Base Color	Black, opaque
Accelerator Color	Off-white, opaque
Base Resin	Epoxy
Accelerator Resin	Amine

Attribute Name	Value
Accelerator Density	1.22 g/cm ³ (10.2 lb/gal)
Base Density	1.16 g/cm ³ (9.7 lb/in ³)

Temperature: 23 °C (73 °F)

Attribute Name	Value
Accelerator Viscosity	12,000 cP (12,000 mPa.s)
Base Viscosity	11,000 cP (11,000 mPa.s)

Typical Mixed Physical Properties

Attribute Name	Temperature	Value
Worklife	23 °C (73 °F)	70 min
Open Time		70 min ¹
Time to Handling Strength	23 °C (73 °F)	6 h ²
Time to Full Cure	23 °C (73 °F)	24 h ³
Cure Shrinkage		4.09%

¹ 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 3.2 mm (1/8 in) bead of molten adhesive on a non-metallic surface.

² Minimum time required to achieve 0.3 MPa (50 psi) of overlap shear strength. Cure times are approximate and depend on adhesive temperature.

³ 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
Shore D Hardness	ASTM D2240	23 °C (73 °F)	80
Weight Loss by Thermal Gravimetric Analysis (TGA)		122 °C (252 °F)	0.4%
Weight Loss by Thermal Gravimetric Analysis (TGA)		175 °C (347 °F)	0.9%
Weight Loss by Thermal Gravimetric Analysis (TGA)		210 °C (410 °F)	1.5%

Temperature: 23 °C (73 °F)

Test Condition: 10 mm/min

Dwell Time: 7 d

Attribute Name	Test Method	Value
Elongation	ASTM D638, ISO 527	4.2% ¹

¹ Type IV dogbone

Typical Performance Characteristics

Overlap Shear Strength

Temperature: 23 °C (73 °F)

Dwell Time: 7 d

Test Method: ASTM D1002, ISO 4587

Test Condition	Substrate	Surface Prep	Value
23 °C	ABS	Solvent Wipe	1.4 MPa (200 lb/in ²) ¹
23 °C	Acrylic (PMMA)	Solvent Wipe	0.5 MPa (70 lb/in ²) ¹
	Aluminum	Sandblasted	16.4 MPa (2380 lb/in ²) ¹
23 °C	Copper	Solvent Wipe	9.7 MPa (1410 lb/in ²) ¹
	CRS	Acetone/Abrade/Acetone	13.5 MPa (1960 lb/in ²) ¹
	FRP (Epoxy)	IPA Wipe/Abrade/IPA Wipe	14.1 MPa (2040 lb/in ²) ¹
	FRP (Polyester)	IPA Wipe/Abrade/IPA Wipe	6.1 MPa (880 lb/in ²) ¹

Test Condition	Substrate	Surface Prep	Value
23 °C	FR-4	Solvent Wipe	15.3 MPa (2220 lb/in ²) ¹
23 °C	Polycarbonate (PC)	Solvent Wipe	0.4 MPa (60 lb/in ²) ¹
23 °C	Polyvinyl chloride (PVC)	Solvent Wipe	2.0 MPa (290 lb/in ²) ¹

¹ 25 mm by 12.7 mm (1" x 1/2"), bondline thickness: 0.07-0.25 mm (3-10 mil). Substrate size: 102mm x 25mm (1" x 4"). Separation rate 1.2 mm/min (0.05 in/min) for metal, 51 mm/min (2 in/min) for plastic, 510 mm/min (20 in/min) for rubber.

Cohesive Failure (CF), Adhesive Failure (AF), Mixed Failure (MF), Substrate Failure (SF)

Substrate: Aluminum
Surface Prep: Etched
Temperature: 23 °C (73 °F)
Test Condition: 23 °C
Dwell Time: 24 h

Attribute Name	Test Method	Value
Overlap Shear Strength	ASTM D1002, ISO 4587	16.9 MPa (2450 lb/in ²) ¹

¹ 25 mm by 12.7 mm (1" x 1/2"), bondline thickness: 0.07-0.25 mm (3-10 mil). Substrate size: 102mm x 25mm (1" x 4"). Separation rate 1.2 mm/min (0.05 in/min) for metal, 51 mm/min (2 in/min) for plastic, 510 mm/min (20 in/min) for rubber.

Cohesive Failure (CF), Adhesive Failure (AF), Mixed Failure (MF), Substrate Failure (SF)

Substrate: Aluminum
Surface Prep: MEK,Sandblast,MEK
Test Condition: Pendulum Impact

Attribute Name	Test Method	Value
Impact Shear Strength	ASTM D950	3 J ¹

¹ 21.7J Hammer

Typical Environmental Performance

Overlap Shear Strength

Substrate: Aluminum
Dwell Time: 30 min
Test Method: ASTM D1002, ISO 4587

Temperature	Test Condition	Value
-40 °C (-40 °F)	-40 °C	6.8 MPa (990 lb/in ²) (42%) ¹
49 °C (120 °F)	49 °C	15.5 MPa (2250 lb/in ²) (95%) ¹
82 °C (180 °F)	82 °C	1.9 MPa (280 lb/in ²) (12%) ¹
200 °C (392 °F)	200 °C	0.6 MPa (80 lb/in ²) (3%) ¹

¹ Performance % to control sample @RT. Samples were cured @RT for at least 24h prior to Environmental Exposure.
Overlap shear (OLS) strengths were measured on 1in wide 1/2in overlap specimens on 1in x 4in x .060in substrates.
Jaw separation 0.05 in/min. 10 mil bondline.

Overlap Shear Strength

Substrate: Aluminum
Surface Prep: MEK,Sandblast,MEK
Temperature: 23 °C (73 °F)
Test Condition: 23 °C
Dwell Time: 7 d
Test Method: ASTM D1002, ISO 4587

Environmental Condition	Value
85 °C + 85 %RH: 500 hrs	22.3 MPa (3240 lb/in ²) (136%) ¹
200°C / 30 minutes	22.0 MPa (3190 lb/in ²) (134%) ¹
Diesel Fuel: 500 hrs	12.8 MPa (1850 lb/in ²) (53%) ¹

Environmental Condition	Value
Salt water (5% wt in water): 500 hrs	5.1 MPa (740 lb/in ²) (31%) ¹
Water: 500 hrs	10.1 MPa (1470 lb/in ²) (62%) ¹

¹ 25 mm by 12.7 mm (1" x 1/2"), bondline thickness: 0.07-0.25 mm (3-10 mil). Substrate size: 102mm x 25mm (1" x 4"). Separation rate 1.2 mm/min (0.05 in/min) for metal, 51 mm/min (2 in/min) for plastic, 510 mm/min (20 in/min) for rubber.

Cohesive Failure (CF), Adhesive Failure (AF), Mixed Failure (MF), Substrate Failure (SF)

Substrate: CRS

Surface Prep: Acetone/Abrade/Acetone

Temperature: 23 °C (73 °F)

Test Condition: 23 °C

Dwell Time: 7 d

Environmental Condition: 200°C / 30 minutes

Attribute Name	Test Method	Value
Overlap Shear Strength	ASTM D1002, ISO 4587	17.9 MPa (2600 lb/in ²) (133%) ¹

¹ 25 mm by 12.7 mm (1" x 1/2"), bondline thickness: 0.07-0.25 mm (3-10 mil). Substrate size: 102mm x 25mm (1" x 4"). Separation rate 1.2 mm/min (0.05 in/min) for metal, 51 mm/min (2 in/min) for plastic, 510 mm/min (20 in/min) for rubber.

Cohesive Failure (CF), Adhesive Failure (AF), Mixed Failure (MF), Substrate Failure (SF)

Substrate: PVC

Surface Prep: IPA Wipe

Temperature: 23 °C (73 °F)

Test Condition: 23 °C

Dwell Time: 7 d

Environmental Condition: 49 °C + 80 %RH: 500 hrs

Attribute Name	Test Method	Value
Overlap Shear Strength	ASTM D1002, ISO 4587	4.2 MPa (610 lb/in ²) (210%) ¹

¹ 25 mm by 12.7 mm (1" x 1/2"), bondline thickness: 0.07-0.25 mm (3-10 mil). Substrate size: 102mm x 25mm (1" x 4"). Separation rate 1.2 mm/min (0.05 in/min) for metal, 51 mm/min (2 in/min) for plastic, 510 mm/min (20 in/min) for rubber.

Cohesive Failure (CF), Adhesive Failure (AF), Mixed Failure (MF), Substrate Failure (SF)

Overlap Shear Strength

Temperature: 23 °C (73 °F)

Test Condition: 23 °C

Dwell Time: 7 d

Test Method: ASTM D1002, ISO 4587

Environmental Condition	Substrate	Surface Prep	Value
Acetone Soak: 1 Hr	Aluminum	MEK,Sandblast,MEK	12.8 MPa (1850 lb/in) (78%) ¹
Acetone Soak: 720 Hr	Aluminum	MEK,Sandblast,MEK	1.0 MPa (150 lb/in ²) (6%) ¹
Gasoline Soak: 1 Hr	Aluminum	MEK,Sandblast,MEK	11.7 MPa (1700 lb/in ²) (71%) ¹
Gasoline Soak: 720 Hr	Aluminum	MEK,Sandblast,MEK	15.9 MPa (2310 lb/in ²) (97%) ¹
IPA Soak: 1 Hr	Aluminum	MEK,Sandblast,MEK	13.8 MPa (2000 lb/in ²) (84%) ¹
IPA Soak: 720 Hr	Aluminum	MEK,Sandblast,MEK	18.3 MPa (2650 lb/in ²) (111%) ¹
MEK Soak: 1 Hr	Aluminum	MEK,Sandblast,MEK	13.4 MPa (1950 lb/in ²) (82%) ¹

Environmental Condition	Substrate	Surface Prep	Value
MEK Soak: 720 Hr	Aluminum	MEK,Sandblast,MEK	13.2 MPa (1910 lb/in ²) (80%) ¹
45°C/96%RH: 500 hrs	Copper	Solvent Wipe	8.0 MPa (1160 lb/in ²) (82%) ²
85°C/85%RH: 500 hrs	Copper	Solvent Wipe	5.1 MPa (740 lb/in ²) (52%) ²

¹ 25 mm (1") wide, 12.7 mm (1/2") overlap samples, 25 mm (1") x 102 mm (4") substrates, bondline thickness: 0.76-0.13 mm (3-5 mil)
Separation rate 2.5 mm/min (0.1 in/min) metal, 51 mm/min (2 in/min) plastic, 510 mm/min (20 in/min) rubber.
Substrate thickness: steel 1.5 mm (60 mil), other metal 1.3-1.6 mm (50-64 mil), rubber and plastic 3.2 mm (125 mil)

² 25 mm by 12.7 mm (1" x 1/2"), bondline thickness: 0.07-0.25 mm (3-10 mil). Substrate size: 102mm x 25mm (1" x 4"). Separation rate 1.2 mm/min (0.05 in/min) for metal, 51 mm/min (2 in/min) for plastic, 510 mm/min (20 in/min) for rubber.

Cohesive Failure (CF), Adhesive Failure (AF), Mixed Failure (MF), Substrate Failure (SF)

Thermal Shock Resistance

Substrate: Aluminum

Surface Prep: MEK / Abrade / MEK

Test Condition: 23 °C

Test Method: ASTM D1002, ISO 4587

Environmental Condition	Value
100 Cycles, Cycle: 85C for 30 minutes PLUS -40C for 30 min (min 10C/min ramp)	21.2 MPa (3070 lb/in ²) (129%) ¹
200 Cycles, Cycle: 85C for 30 minutes PLUS -40C for 30 min (min 10C/min ramp)	18.8 MPa (2720 lb/in ²) (114%) ¹
300 Cycles, Cycle: 85C for 30 minutes PLUS -40C for 30 min (min 10C/min ramp)	24.8 MPa (3600 lb/in ²) (151%) ¹

¹ Overlap shear: 25 mm by 12.7 mm (1" x 1/2"), bondline thickness: 0.07-0.25 mm (3-10 mil). Substrate size: 102mm x 25mm (1" x 4"). Separation rate 1.2 mm/min (0.05 in/min) for metal, 51 mm/min (2 in/min) for plastic, 510 mm/min (20 in/min) for rubber.
Cohesive Failure (CF), Adhesive Failure (AF), Mixed Failure (MF), Substrate Failure (SF)

Electrical and Thermal Properties

Attribute Name	Test Method	Test Condition	Value
Coefficient of Thermal Expansion		Below Tg (5 ~ 30 °C)	76.8 x 10 ⁻⁶ m/m/°C
Coefficient of Thermal Expansion		Above Tg (60 ~ 125 °C)	189.3 x 10 ⁻⁶ m/m/°C
Thermal Conductivity	C177	110 °F	0.311 W/m/K ¹
Glass Transition Temperature (Tg)			38 °C (100 °F) ²

¹ Thermal conductivity determined using C-matic Instrument using 51 mm (2 in) diameter samples.

² Glass Transition Temperature (Tg) determined using DSC Analyzer with a heating rate of 10 °C per minute. Second heat values given.

Temperature: 23 °C (73 °F)

Attribute Name	Test Method	Test Condition	Value
Dielectric Constant	ASTM D150	1 KHz	3.87
Dissipation Factor	ASTM D150	1 KHz	0.0095
Volume Resistivity	ASTM D257		2.37 x 10 ¹⁵ Ω-cm

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 16 °C (60 °F) or above until firm. Heat up to 93 °C (200 °F) will speed curing.

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

23 °C (73 °F) 24 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 88 °C ± 5 °C (190 °F ± 10 °F) for 10-20 minutes. Rinse immediately in large quantities of cold running water.

2. Optimized FPL Etch Solution (1 liter):

Distilled Water - 700 ml plus balance of liter (see below)

Sodium Dichromate - 28 to 67.3 grams

Sulfuric Acid - 287.9 to 310.0 grams

Aluminum Chips - 1.5 grams/liter of mixed solution

To prepare 1 liter of this solution, dissolve sodium dichromate in 700 ml of distilled water. Add sulfuric acid and mix well. Add additional distilled water to fill to 1 liter. Heat mixed solution to 66 to 71 °C (150 to 160 °F). Dissolve 1.5 grams of 2024 bare aluminum chips per liter of mixed solution. Gentle agitation will help aluminum dissolve in about 24 hours.

To etch aluminum panels place them in FPL etch solution heated to 66 to 71 °C (150 to 160 °F). Panels should soak for 12 to 15 minutes.

3. Rinse: Rinse panels in clear running tap water.
4. Dry: Air dry 15 minutes; force dry 10 minutes at 66 °C ± 5 °C (150 °F ± 10 °F).
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 18 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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