

December, 2009

## 3M™ Scotch-Weld™ Epoxy Adhesive DP125 Gray

### Product Description

Scotch-Weld epoxy adhesive DP125 Gray is a filled, pigmented version of the Scotch-Weld epoxy adhesive DP125 Translucent and has similar performance and flexibility properties.

Available in bulk containers as 3M™ Scotch-Weld™ Epoxy Adhesive 125 B/A Gray.

### Product Features

- 25 minute worklife
- Flexible
- Gray
- High peel and shear strength
- Controlled flow
- 1:1 mix ratio
- Recognized as meeting UL 94 HB



# 3M™ Scotch-Weld™ Epoxy Adhesive DP125 Gray

## 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

Property	Values	Method	Test Condition	Notes
Base Color	Gray			
Accelerator Color	Amber			
Base Viscosity	35,000-75,000 cP	3M C1d	80°F(27°C)	Procedure involves Brookfield RVF, #7 spindle, 20 rpm. Measurement taken after 1 minute rotation.
Accelerator Viscosity	45,000-65,000 cP	3M C1d	80°F(27°C)	Procedure involves Brookfield RVF, #7 spindle, 20 rpm. Measurement taken after 1 minute rotation.
Base Resin	Epoxy/Amine			
Base Net Weight	10.3 to 10.7 lb/gal			
Accelerator Net Weight	8.5 to 8.9 lb/gal			
Mix Ratio by Volume (B:A)	1:1			
Mix Ratio by Weight (B:A)	1.2:1			

## Typical Performance Characteristics

### Additional Test notes

The following product performance data was obtained in the 3M laboratory under the conditions specified. The following data show typical results obtained with the 3M™ Scotch-Weld™ Adhesives when applied to properly prepared substrates, cured, and tested according to the specifications indicated. The data was generated using the 3M™ EPX™ Applicator System equipped with an EPX applicator static mixer, according to manufacturer's directions. Thorough hand mixing should afford comparable results.

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

**Elongation:** 120 %

### Conditions

**Dwell/Cure Time:** 2 hr Room Temperature, plus 2 hr @ 160°F(71°C)

### Methods

ASTM D882

### Additional Information

Notes: Samples were 2 in. dumbbells with .0125 in. neck and .030 in. sample thickness. Separation rate was 2 inches per minute.

**Typical Performance Characteristics (continued)**

Overlap Shear Strength	Substrate
3400 lb/in <sup>2</sup>	Etched Aluminum
2200 lb/in <sup>2</sup>	Sanded Aluminum (60 grit)
1900 lb/in <sup>2</sup>	Cold Rolled Steel
900 lb/in <sup>2</sup>	Wood - Fir
250 lb/in <sup>2</sup>	Glass with 3M™ Scotch-Weld™ Primer EC3901
880 lb/in <sup>2</sup>	Polycarbonate (PC)
550 lb/in <sup>2</sup>	Acrylic (PMMA)
1800 lb/in <sup>2</sup>	Fiberglass Reinforced Plastic
520 lb/in <sup>2</sup>	ABS
750 lb/in <sup>2</sup>	Polyvinyl chloride (PVC)
60 lb/in <sup>2</sup>	Polypropylene (PP)
400 lb/in <sup>2</sup>	Glass, Borosilicate

Property: Overlap Shear Strength

Method: ASTM D1002

Dwell/Cure Time: 24 hr @ Room Temperature + 2 hr @ 160°F(71°C)

Test Condition : Room Temperature

Substrate Notes: 0.005-0.008in bondline

notes: Overlap shear (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. These bonds were made individually using 1 in. x 4 in. pieces of substrate. The separation rate of the testing jaws was 0.1 in. per minute for metals, 2 in. per minute for plastics and 20 in. per minute for rubbers. The thickness of the substrates were: steel, 0.060 in.; other metals, 0.05-0.064 in.; rubber, 0.125 in.; plastics, 0.125 in.

Environmental Resistance (OLS)	Dwell/Cure Time
4500 lb/in <sup>2</sup>	24 hr @ Room Temperature + 2 hr @ 160°F(71°C)
5000 lb/in <sup>2</sup>	24 hr @ Room Temperature + 2 hr @ 240°F(116°C)
3500 lb/in <sup>2</sup>	1 wk Room Temperature + 1 wk @ 90°F(32°C)/90% RH
5400 lb/in <sup>2</sup>	1 wk Room Temperature + 1 wk 248°F(120°C)
3000 lb/in <sup>2</sup>	1 wk Room Temperature + 1 wk H2O immersion

Property: Environmental Resistance (OLS)

Method: ASTM D1002

Test Condition : Room Temperature

Substrate: Etched Aluminum

Substrate Notes: 0.005-0.008in bondline

notes: Overlap shear (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. These bonds were made individually using 1 in. x 4 in. pieces of substrate. The separation rate of the testing jaws was 0.1 in. per minute for metals, 2 in. per minute for plastics and 20 in. per minute for rubbers. The thickness of the substrates were: steel, 0.060 in.; other metals, 0.05-0.064 in.; rubber, 0.125 in.; plastics, 0.125 in.

**Typical Performance Characteristics (continued)**

Overlap Shear Strength (at Temperature)	Test Condition
3400 lb/in <sup>2</sup>	-67°F(-55°C)
4300 lb/in <sup>2</sup>	Room Temperature
700 lb/in <sup>2</sup>	120°F(49°C)
450 lb/in <sup>2</sup>	150°F(66°C)
400 lb/in <sup>2</sup>	180°F(82°C)

Property: Overlap Shear Strength (at Temperature)  
 Method: ASTM D1002  
 Dwell/Cure Time: 24 hr @ Room Temperature + 2 hr @ 160°F(71°C)  
 Substrate: Etched Aluminum  
 Substrate Notes: 0.005-0.008in bondline  
 notes: Overlap shear (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. These bonds were made individually using 1 in. x 4 in. pieces of substrate. The separation rate of the testing jaws was 0.1 in. per minute for metals, 2 in. per minute for plastics and 20 in. per minute for rubbers. The thickness of the substrates were: steel, 0.060 in.; other metals, 0.05-0.064 in.; rubber, 0.125 in.; plastics, 0.125 in.

T-Peel Adhesion	Test Condition
3 lb/in width	-67°F(-55°C)
35 lb/in width	Room Temperature
18 lb/in width	120°F(49°C)
3 lb/in width	150°F(66°C)
2 lb/in width	180°F(82°C)

Property: T-Peel Adhesion  
 Method: ASTM D1876  
 Dwell/Cure Time: 24 hr @ Room Temperature + 2 hr @ 160°F(71°C)  
 Substrate: Etched Aluminum  
 Substrate Notes: 0.005-0.008in bondline  
 notes: T-peel strengths were measured on 1 in. wide bonds at 73°F (23°C). The testing jaw separation rate was 20 inches per minute. The substrates were 0.020 in. thick.

Solvent Resistance	Environmental Condition
A	Immersed in Acetone one hour
A	Immersed in Acetone one month
A	Immersed in Isopropyl Alcohol one hour
A	Immersed in Isopropyl Alcohol one month
A	Immersed in Freon TF one hour
A	Immersed in Freon TF one month
A	Immersed in Freon TMC one hour
B	Immersed in Freon TMC one month
A	Immersed in 1, 1, 1 - Trichloroethane one hour
A	Immersed in 1, 1, 1 - Trichloroethane one month
A	Immersed in RMA Flux one hour

**Typical Performance Characteristics (continued)**

Solvent Resistance	Environmental Condition
A	Immersed in RMA Flux one month

Property: Solvent Resistance

Dwell/Cure Time: 24 hr @ Room Temperature + 2 hr @ 160°F(71°C)

notes: Solvent resistance was determined using cured samples (1/2 in. x 4 in. x 1/8 in. thickness) immersed in the test solvent for 1 hour and 1 month. After the allotted period of time, the sample was removed and visually examined for surface attack as compared to the control. Key: A - Unaffected - no change to color or surface texture. B - Slight attack - noticeable swelling of surface. C - Moderate/severe attack - extreme swelling of surface.

**Typical Mixed Physical Properties**

Property	Values	Test Condition	Method	Notes	Substrate
Color	Gray	Mixed			
Worklife, 2g mixed	25 min	Room Temperature	3M C3180	Procedure involves periodically measuring a 2 gram mixed mass for self leveling and wetting properties. This time will also approximate the usable worklife in an 3M™ EPX™ Applicator mixing nozzle.	
Worklife, 20g mixed	15 min	Room Temperature	3M C3180	Procedure involves periodically measuring a 2 gram mixed mass for self leveling and wetting properties. This time will also approximate the usable worklife in an 3M™ EPX™ Applicator mixing nozzle.	
Tack Free Time	≈2 h		3M C3173	Involves dispensing 0.5 gram amount of adhesive onto substrate and testing periodically for no adhesive transfer to metal spatula.	
Time to Handling Strength	≈2.5 h		3M C3179	Time to handling strength taken to be that required to achieve a 50 psi overlap shear (OLS) strength using aluminum substrates.	Aluminum
Time to Full Cure	7 day			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 Mixed Physical Properties (continued)**

Rate of Strength Buildup (OLS)	Dwell/Cure Time
500 lb/in <sup>2</sup>	6 hr
1700 lb/in <sup>2</sup>	24 hr
2300 lb/in <sup>2</sup>	7 days
3300 lb/in <sup>2</sup>	1 month
250 lb/in <sup>2</sup>	3 hr

Property: Rate of Strength Buildup (OLS)

Method: ASTM D1002

Test Condition : Room Temperature

Substrate: Etched Aluminum

Substrate Notes: 0.005-0.008in bondline

notes: Overlap shear (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. These bonds were made individually using 1 in. x 4 in. pieces of substrate. The separation rate of the testing jaws was 0.1 in. per minute for metals, 2 in. per minute for plastics and 20 in. per minute for rubbers. The thickness of the substrates were: steel, 0.060 in.; other metals, 0.05-0.064 in.; rubber, 0.125 in.; plastics, 0.125 in.

**Typical Cured Characteristics**

Property	Values	Method	Dwell/Cure Time	Notes	Test Condition
Tensile Strength	3300 lb/in <sup>2</sup>	ASTM D882	2 hr Room Temperature, plus 2 hr @ 160°F(71°C)	Samples were 2" dumbbells with .0125" neck and .030" sample thickness. Separation rate was 2 inches per minute.	
Shore D Hardness	70	ASTM D2240			Room Temperature
Weight Loss by Thermal Gravimetric Analysis (TGA)	1 %	ASTM E1131		Weight loss by Thermal Gravimetric Analysis reported as that temperature at which 5% weight loss occurs by TGA in air at 5°C (9°F) rise per minute.	349°F(176°C)
Weight Loss by Thermal Gravimetric Analysis (TGA)	5 %	ASTM E1131		Weight loss by Thermal Gravimetric Analysis reported as that temperature at which 5% weight loss occurs by TGA in air at 5°C (9°F) rise per minute.	577°F(303°C)
Thermal Shock Resistance	Pass 5 cycles without cracking	3M C3174		Involves potting a metal washer into a 2 in. x 0.5 in. thick section and cycling this test specimen to colder and colder temperatures.	Potted Washer Olyphant Test, 100°C [air] to -50°C [liquid]

# 3M™ Scotch-Weld™ Epoxy Adhesive DP125 Gray

## Electrical and Thermal Properties

Glass Transition Temperature (Tg)		Test Condition
12 °C	54 °F	Onset
23 °C	73 °F	Mid-Point

Property: Glass Transition Temperature (Tg)

notes: Glass Transition Temperature (Tg) determined using DSC Analyzer with a heating rate of 68°F (20°C) per minute. Second heat values given.

Thermal Conductivity		
$0.36 \times 10^{-3} \text{ Cal/s/cm}^{\circ}\text{C}$	15.1 W/m/K	0.087 (btu-ft)/(h-ft <sup>2</sup> -°F)

Property: Thermal Conductivity

Method: C177

Test Condition : 110°F on .25 inch samples

notes: Thermal conductivity determined using C-matic Instrument using 2 in. diameter samples.

Property	Values	Method	Test Condition	Notes
Dielectric Constant	6.3	ASTM D150	1 KHz, Room Temperature	
Dielectric Constant	0.13	ASTM D150	1MHz, Room Temperature	
Dielectric Strength	680 V/mil	ASTM D149		Sample Thickness Approx. 30 mil.
Volume Resistivity	$1.0 \times 10^{11} \Omega\text{-cm}$	ASTM D257	Room Temperature	
Coefficient of Thermal Expansion	98 m/m/°C		Below Tg (5-20°C range)	TCE determined using TMA Analyzer using a heating rate of 10°C per minute. Second heat values given.
Coefficient of Thermal Expansion	187 m/m/°C		Above Tg (65-140°C range)	TCE determined using TMA Analyzer using a heating rate of 10°C per minute. Second heat values given.

## Handling/Application Information

### Application Equipment

For small or intermittent applications the 3M™ EPX™ Applicator System is a convenient method of application.

For larger applications these products may be applied by use of flow equipment.

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

## Handling/Application Information (continued)

### Directions for Use

1. For high strength structural bonds, paints, 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. Use gloves to minimize skin contact. Do not use solvents for cleaning hands.

3. Mixing.

For Duo Pak Cartridges

3M™ Scotch-Weld™ Epoxy Adhesives DP125 Translucent and Gray are supplied in a dual syringe plastic duo-pak cartridge as part of the 3M™ EPX™ Applicator System. 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 duopak 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 automatic 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 adhesive and mix thoroughly. Mix approximately 15 seconds after uniform color is obtained.

For Bulk Containers

Mix thoroughly by weight or volume in the proportions specified in the typical uncured properties section. Mix approximately 15 seconds after uniform color is obtained.

4. For maximum bond strength, apply adhesive evenly to both surfaces to be joined.

5. Application to the substrates should be made within 20 minutes. Larger quantities and/or higher temperatures will reduce this working time.

6. Join the adhesive coated surfaces and allow to cure at 60°F (16°C) or above until completely firm. Heat up to 200°F (93°C), will speed curing. These products will cure in 7 days @ 75°F (24°C).

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 manufacturer's precautions and directions for use.

Adhesive Coverage (typical): A 0.005 in. thick bondline will yield a coverage of 320 sqft/gallon.



# 3M™ Scotch-Weld™ Epoxy Adhesive DP125 Gray

## Handling/Application Information (continued)

### 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 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 .

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.

5. If primer is to be used, it should be applied within 4 hours after surface preparation.

Note: Read and follow supplier's environmental, health, and safety documentation for these chemicals prior to preparation of this solution.

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 primer such as 3M™ Scotch-Weld™ Metal Primer EC3901 to the glass surfaces to be bonded and allow the primer to dry before bonding.

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

### Storage and Shelf Life

Store products at 60-80°F (16-27°C) for maximum shelf life.

These products have a shelf life of 24 months from date of manufacture in their unopened original containers.

### Industry Specifications

UL 94 HB

### Trademarks

3M, Scotch-Weld and EPX are trademarks of 3M Company.

### References

Property	Values
3m.com Product Page	<a href="https://www.3m.com/3M/en_US/company-us/all-3m-products/~/3M-Scotch-Weld-Epoxy-Adhesive-DP125?N=5002385+3293242443&amp;rt=rud">https://www.3m.com/3M/en_US/company-us/all-3m-products/~/3M-Scotch-Weld-Epoxy-Adhesive-DP125?N=5002385+3293242443&amp;rt=rud</a>
Safety Data Sheet (SDS)	<a href="https://www.3m.com/3M/en_US/company-us/SDS-search/results/?gsaAction=msdsSRA&amp;msdsLocale=en_US&amp;co=ptn&amp;q=DP125 Gray">https://www.3m.com/3M/en_US/company-us/SDS-search/results/?gsaAction=msdsSRA&amp;msdsLocale=en_US&amp;co=ptn&amp;q=DP125 Gray</a>

# 3M™ Scotch-Weld™ Epoxy Adhesive DP125 Gray

## Family Group

	DP125 Translucent	DP125 Gray
Time to Handling Strength (h) Substrate: Aluminum	≈2.5	≈2.5
Color Test Condition: Mixed	Translucent	Gray
Shore D Hardness Test Condition: Room Temperature	55	70

## ISO Statement

This Industrial Adhesives and Tapes Division product was manufactured under a 3M quality system registered to ISO 9001 standards.

## 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 or (651) 737-6501.

## Information

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