Scotch-Weld™

Epoxy Adhesives

DP125 Translucent and Grey

Technical Data **February, 2016**

Product Description

3M™ Scotch-Weld™ Epoxy Adhesive DP125 Translucent is a faster curing version of the 3M™ Scotch-Weld™ Epoxy Adhesive 2216 Translucent B/A. The worklife and cure time has been reduced from hours and days for the Scotch-Weld epoxy adhesive 2216 Translucent B/A to minutes and hours. Final shear and peel strengths remain similar or even slightly improved compared to the Scotch-Weld epoxy adhesive 2216 Translucent.

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 Translucent and 125 B/A Grey.

Features

- 25 minute worklife
- Flexible
- Translucent or Grey
- High peel and shear strength
- Controlled flow (grey)
- 1:1 mix ratio

Typical Uncured Properties

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

		3M™ Scotch-Weld™ Epoxy Adhesive DP125 Translucent	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Grey
Base Resins		Epoxy/Amine	Epoxy/Amine
Viscosity[1], Approximate @ 27°C (80°F)	Base (B) Accelerator (A)	2,000-8,000 cps 22,000-33,000 cps	35,000-75,000 cps 45,000-65,000 cps
Net Weight (Lbs./gal.)	Base (B) Accelerator (A)	9.3-9.7 8.4-8.6	10.3-10.7 8.5-8.9
Colour	Base (B) Accelerator (A)	Clear Amber	Grey Amber
Mix Ratio (B:A)	By Volume By Weight	1:1 1.10:1	1:1 1.2:1
Worklife[2] @ 23°C (73°F)	2 gram 20 gram	25 min. 18 min.	25 min. 15 min.

Footnotes:

1. Viscosity determined using 3M test method C-1d. Procedure involves Brookfield RVF, #7 spindle, 20 rpm and 27°C (80°F). Measurement taken after 1 minute.
2. Worklife determined using 3M test method C-3180. 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.

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Typical Cured Properties

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Physical

	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Translucent	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Gray
Colour	Translucent	Grey
Hardness (ASTM D2240) Shore D	55	70
Worklife[2]	20-30 minutes	20-30 minutes
Tack-free Time[3]	⊕ 2 hrs	⊕ 2 hrs
Time to Handling Strength[4]	⊕ 2.5 hrs	⊕ 2.5 hrs
Full Cure Time[5]	7 days	7 days
Elongation[6]	150%	120%
Tensile Strength[6]	2500 psi	3300 psi

Thermal

	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Translucent	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Grey
Weight Loss by Thermal Gravimetric Analysis (TGA)[7]	1% @ 164°C 5% @ 301°C	1% @ 176°C 5% @ 303°C
Thermal Coefficient of Expansion (TCE) by TMA[8] (° x 10^{-6} units/unit/°C) **Below Tg** **Above Tg**	 112 (5-20°C range) 190 (65-140°C range)	 98 (5-20°C range) 187 (65-140°C range)
Glass Transition Temperature (Tg) by DCS[9] **Onset** **Mid-Point**	 3°C 15°C	 12°C 23°C
Thermal Conductivity[10] (@ 110°F on .250 in. samples) **BTU - ft./ft.^{2} - hr. - °F)** **Cal./sec. - cm - °C)** **Watt/m - °C**	 .089 .37 x 10^{-3} .154	 .087 .36 x 10^{-3} .151
Thermal Shock Resistance[11] **Potted Washer Olyphant Test (3M Test Method C-3174) +100°C [air] to -50°C [liquid])**	Pass 5 cycles without cracking	Pass 5 cycles without cracking

Electrical

	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Translucent	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Grey
Dielectric Constant @ 1 KH_z @ 23°C (ASTM D150)	6.3	6.3
Dissipation Factor @ 1 KH_z @ 23°C (ASTM D150)	0.14	0.13
Dielectric Strength (ASTM D 149) Sample Thickness Approx. 30 mil	765 volts/mil	680 volts/mil
Volume Resistivity (ASTM D257)	1.2 x 10^{11} ohm-cm	1.0 x 10^{11} ohm-cm

Footnotes:

2. Worklife determined using 3M test method C-3180. 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.
3. Tack-free time determined per 3M test method C-3173. Involves dispensing 0.5 gram amount of adhesive onto substrate and testing periodically for no adhesive transfer to metal spatula.
4. Handling strength determined per 3M test method C-3179. Time to handling strength taken to be that required to achieve a 50 psi OLS strength using aluminum substrates.
5. 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.
6. Tensile and Elongation. Used procedure in 3M test method C-3094/ATSM D 882. Samples were 2 in. dumbbells with .0125 in. neck and .030 in. sample thickness. Separation rate was 2 inches per minute. Samples cured 2 hrs RT plus 2 hrs/71°C (160°F).
7. Weight loss by TGA reported as that temperature at which 5% weight loss occurs by TGA in air at 5°C rise per minute per ASTM 1131-86.
8. TCE determined using TMA Analyzer using a heating rate of 10°C per minute. Second heat values given.
9. Glass Transition Temperature (Tg) determined using DSC Analyzer with a heating rate of 20°C per minute. Second heat values given.
10. Thermal conductivity determined using ASTM C177 and C-matic Instrument using 2 in. diameter samples.
11. Thermal shock resistance run per 3M test method C-3174. 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.

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Typical Adhesive Performance Characteristics

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.

Overlap Shear Strength (OLS) to[12]
(Bonds cured 24 hrs @ RT + 2 hrs 71°C [160°F])

	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Translucent	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Grey
Etched Aluminum	2500 psi	3400 psi
Sanded Aluminum (60 grit)	1400 psi	2200 psi
Cold Rolled Steel	1500 psi	1900 psi
Wood, Fir	700 psi	900 psi
Glass, Borosilicate	250 psi	400 psi
Glass, +3M™ Scotch-Weld™ Primer 3901	200 psi	250 psi
Polycarbonate	700 psi	880 psi
Acrylic	420 psi	550 psi
Fibreglass	1200 psi	1800 psi
ABS	460 psi	520 psi
PVC	500 psi	750 psi
Polypropylene	25 psi	60 psi

Footnotes:

12. 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 thickness of the bond line was 0.005-0.008 in. All strengths were measured at 21°C (70°F) except were noted. (Test per ASTM D1002-72.)

    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.

Rate of Strength Buildup
(OLS on Etched Aluminum)[12]
Bonds tested after:

	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Translucent	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Grey
3 hrs @ RT	100 psi	250 psi
6 hrs @ RT	300 psi	500 psi
1 day @ RT	1300 psi	1700 psi
1 wk @ RT	1900 psi	2300 psi
1 mo @ RT	2050 psi	3300 psi

Environmental Aging
(OLS on Etched Aluminum)[12]
Bonds tested after:

`	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Translucent	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Grey
24 hrs RT + 2 hrs @ 71°C (160°F)	2300 psi	4500 psi
24 hrs RT + 2 hrs @ 116°C (240°F)	3300 psi	5000 psi
1 wk RT + 1 wk @ 90°F/90% RH	2600 psi	3500 psi
1 wk RT + 1 wk 120°C (248°F)	4600 psi	5400 psi
1 wk RT + 1 wk H_2O Immersion	2100 psi	3000 psi

Typical Adhesive Performance Characteristics *(continued)*

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

Overlap Shear Strength vs Temperature[12]

(Bonds cured 24 hr @ RT + 2 hrs @ 71°C [160°F])

Bonds tested at	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Translucent	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Grey
-55°C (-67°F)	4000 psi	3400 psi
21°C (70°F)	2500 psi	4300 psi
49°C (120°F)	400 psi	700 psi
66°C (150°F)	190 psi	450 psi
82°C (180°F)	150 psi	400 psi

180° Peel Strength vs Temperature[13]

(Bonds cured 24 hr @ RT + 2 hrs @ 71°C [160°F])

	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Translucent	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Grey
-55°C (-67°F)	3 piw	3 piw
21°C (70°F)	35 piw	35 piw
49°C (120°F)	10 piw	18 piw
66°C (150°F)	3 piw	3 piw
82°C (180°F)	2 piw	2 piw

Solvent Resistance[14]

	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Translucent	3M™ Scotch-Weld™ Epoxy Adhesive DP125 Grey
	One Hour/One Month	One Hour/One Month
Acetone	A/A	A/A
Isopropyl Alcohol	A/A	A/A
Freon TF	A/A	A/A
Freon TMC	A/B	A/B
1,1,1-Trichlorethane	A/A	A/A
RMA Flux	A/A	A/A
Key: A - Unaffected, B - Slight Attack, C - Moderate/Severe Attack		

Footnotes:

12. 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 thickness of the bond line was 0.005-0.008 in. All strengths were measured at 21°C (70°F) except were noted. (Test per ASTM D 1002-72.)

    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.

13. T-peel strengths were measured on 1 in. wide bonds at 23°C (73°F). The testing jaw separation rate was 20 inches per minute. The substrates were 0.020 in. thick. (Tests per ASTM D 1876-61T.)

14. Solvent resistance was determined using cured (24 hrs RT + 2 hrs 71°C [160°F]) 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.

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3M™ EPX Pneumatic Applicator Delivery Rates

50 ml Applicator – Maximum Pressure 50 psi

Adhesive*	1/4 in. Nozzle gms/minute
3M™ Scotch-Weld™ Epoxy Adhesive DP125 Translucent	63.6
3M™ Scotch-Weld™ Epoxy Adhesive DP125 Grey	26.4

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

Handling/Curing Information

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 Grey 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 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 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 colour 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 colour 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 16°C (60°F) or above until completely firm. Heat up to 93°C (200°F), will speed curing. These products will cure in 7 days @ 24°C (75°F).
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 sq. ft./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 ± -12°C (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 66°C ± -15°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 66°C ± -15°C (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.

Application Equipment Suggestions

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.

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Storage

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

Shelf Life

These products have a shelf life of two years in their unopened original bulk containers and 15 months in duo-pak cartridges.

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.

Technical Information

The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

Product Use

Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

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ISO 9001: 2000

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3M

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