

October, 2017

3M™ Scotch-Weld™ Epoxy Adhesive DP105 Clear

Product Description

3M™ Scotch-Weld™ Epoxy Adhesive DP105 Clear is available in larger containers like 3M™ Scotch-Weld™ Epoxy Adhesive 105 B/A Clear.

3M™ Scotch-Weld Epoxy Adhesive DP105 Clear is a fast setting, very flexible 1:1 mix ratio epoxy adhesive/sealant. Its flexibility when cured makes it ideal for applications involving dissimilar surfaces where thermal coefficient of expansion may be a problem. It is also unique in that it retains its clear, colorless properties longer than most 5 minute epoxies.

Product Features

- 4 minute worklife
- High peel strength
- Flexible
- 1:1 mix ratio
- Clear



3M™ Scotch-Weld™ Epoxy Adhesive DP105 Clear

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	Clear			
Accelerator Color	Clear			
Base Viscosity	1,000-5,000 cP	3M C1d	80°F(27°C)	Procedure involves Brookfield RVF, #7 spindle, 20 rpm. Measurement taken after 1 minute rotation.
Accelerator Viscosity	8,000-16,000 cP	3M C1d	80°F(27°C)	Procedure involves Brookfield RVF, #7 spindle, 20 rpm. Measurement taken after 1 minute rotation.
Base Resin	Epoxy			
Accelerator Resin	Mercaptan			
Base Net Weight	9.1 to 9.5 lb/gal			
Accelerator Net Weight	9.4 to 9.8 lb/gal			
Mix Ratio by Volume (B:A)	1:1			
Mix Ratio by Weight (B:A)	1:0.97			

Typical Mixed Physical Properties

Exotherm max temp		Test Condition
37 °C	98 °F	2g mass
110 °C	230 °F	20g mass

Property: Exotherm max temp

notes: Exotherm determined using the stated mass mixed for 1 minute and then by electronic thermocouple measuring the peak temperature and time to that temperature.

Typical Mixed Physical Properties (continued)

Rate of Strength Buildup (OLS)	Dwell/Cure Time
250 lb/in ²	60 min
500 lb/in ²	6 hr
1000 lb/in ²	24 hr
2000 lb/in ²	7 days
2000 lb/in ²	1 month

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.

Property	Values	Test Condition	Notes	Method	Substrate
Exotherm time to reach max temp	5 min	2g mass	Exotherm determined using the stated mass mixed for 1 minute and then by electronic thermocouple measuring the peak temperature and time to that temperature.		
Exotherm time to reach max temp	3 min	20g mass	Exotherm determined using the stated mass mixed for 1 minute and then by electronic thermocouple measuring the peak temperature and time to that temperature.		
Worklife	3 to 4 min	Room Temperature	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.	3M C3180	
Worklife, 2g mixed	5 min	Room Temperature	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.	3M C3180	

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Typical Mixed Physical Properties (continued)

Property	Values	Test Condition	Notes	Method	Substrate
Worklife, 20g mixed	4 min	Room Temperature	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.	3M C3180	
Tack Free Time	10 min		Involves dispensing 0.5 gram amount of adhesive onto substrate and testing periodically for no adhesive transfer to metal spatula.	3M C3173	
Time to Handling Strength	20 min	Room Temperature	Time to handling strength taken to be that required to achieve a 50 psi overlap shear (OLS) strength using aluminum substrates.	3M C3179	Aluminum

Typical Cured Characteristics

Property	Values	Method	Dwell/Cure Time	Notes	Test Condition
Tensile Strength	600 lb/in ²	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.	
Transparency and Color	Clear and colorless in thin bondlines				
Shore D Hardness	25 to 30	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 (41°F) rise per minute.	243°F(117°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 (41°F) rise per minute.	552°F(289°C)

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Typical Cured Characteristics (continued)

Property	Values	Method	Dwell/Cure Time	Notes	Test Condition
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]

Typical Performance Characteristics

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.

Overlap Shear Strength	Substrate
2000 lb/in ²	Etched Aluminum
1500 lb/in ²	Sanded Aluminum (60 grit)
1300 lb/in ²	Cold Rolled Steel
300 lb/in ²	Wood - Fir
200 lb/in ²	Glass
250 lb/in ²	Glass with 3M™ Scotch-Weld™ Primer EC3901
400 lb/in ²	Polycarbonate (PC)
250 lb/in ²	Acrylic (PMMA)
1400 lb/in ²	Fiberglass Reinforced Plastic
300 lb/in ²	ABS
520 lb/in ²	Polyvinyl chloride (PVC)
80 lb/in ²	Polypropylene (PP)

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.

Typical Performance Characteristics (continued)

Environmental Resistance (OLS)	Dwell/Cure Time
2000 lb/in ²	24 hr @ Room Temperature + 2 hr @ 160°F(71°C)
2200 lb/in ²	24 hr @ Room Temperature + 2 hr @ 240°F(116°C)
1800 lb/in ²	1 wk Room Temperature + 1 wk @ 90°F(32°C)/90% RH
3000 lb/in ²	1 wk Room Temperature + 1 wk 248°F(120°C)
2000 lb/in ²	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.

Overlap Shear Strength (at Temperature)	Test Condition
3500 lb/in ²	-67°F(-55°C)
2000 lb/in ²	Room Temperature
400 lb/in ²	120°F(49°C)
250 lb/in ²	150°F(66°C)
150 lb/in ²	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
5 lb/in width	120°F(49°C)
2 lb/in width	150°F(66°C)
1 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.

Typical Performance Characteristics (continued)

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
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.

Electrical and Thermal Properties

Glass Transition Temperature (Tg)		Test Condition
8 °C	46 °F	Onset
15 °C	59 °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		
$0.35 \times 10^{-3} \text{ Cal/s/cm}^{\circ}\text{C}$	14.7 W/m/K	0.085 (btu-ft)/(h-ft ² -°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	9.2	ASTM D150	1 KHz, Room Temperature	
Dissipation Factor	0.22	ASTM D150	1 KHz, Room Temperature	

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Electrical and Thermal Properties (continued)

Property	Values	Method	Test Condition	Notes
Dielectric Strength	465 V/mil	ASTM D149		Sample Thickness Approx. 30 mil.
Volume Resistivity	$1.5 \times 10^{10} \Omega\text{-cm}$	ASTM D257	Room Temperature	
Coefficient of Thermal Expansion	$181 \times 10^{-6} \text{ m/m/}^\circ\text{C}$		Above Tg(40-140°C range)	TCE determined using Dupont TMA Analyzer using a heating rate of 50°F (10°C) per minute. Second heat values given.

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 following section on Surface Preparation.

2. Uses gloves to minimize skin contact. Do not use solvents for cleaning hands.

3. Mixing**For Duo-Pak Cartridges**

3M™ Scotch-Weld™ Epoxy Adhesive DP105 Clear is supplied in a dual syringe plastic Duo-Pak cartridge as part of the 3M™ Scotch-Weld™ 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 mixing nozzle to the Duo-Pak cartridge and begin dispensing the adhesives. 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 3 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 48 hours @ 75°F (24°C).

7. Keep parts from moving during cure. Contact pressure is 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.*

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

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

3M™ Scotch-Weld™ Epoxy Adhesive DP105 Clear

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 the 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. Vapor Degrease: 3M™ Novec™ condensing vapors for 5-10 minutes.
2. 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.
3. 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
4. Rinse: Rinse panels in clean running tap water.
5. Dry: Air dry 15 minutes; force dry 10 minutes at 150°F ± 10°F (66°C ± 5°C).
6. 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.*

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

- For small or intermittent applications the 3M™ Scotch-Weld™ EPX™ Applicator is a convenient method of application.
- For larger applications, these products may be applied by use of flow equipment.
- Two part meter/mixing/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.

Storage and Shelf Life

Store 3M™ Scotch-Weld™ Epoxy Adhesive DP-105 Clear at 60-80°F (15-27°C) for maximum shelf life.

These epoxy adhesive products have a shelf life of 24 months in their unopened bulk containers. Shelf life is determined from the date of manufacture.

Trademarks

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

References

1. 3m.com Product Page
Url: http://www.3m.com/3M/en_US/company-us/all-3m-products/~/3M-Scotch-Weld-Epoxy-Adhesive-DP105?N=5002385+3293242301&rt=rud
2. Safety Data Sheet
Url: https://www.3m.com/3M/en_US/company-us/SDS-search/results/?gsaAction=msdsSRA&msdsLocale=en_US&co=ptn&q=DP105 Clear

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.

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