February, 2019

3M™ Scotch-Weld™ Epoxy Adhesive DP100 Plus Clear

Product Description

3M™ Scotch-Weld™ Epoxy Adhesive DP100 Plus Clear is a fast setting, two-part, 1:1 mix ratio mercaptan-cured epoxy adhesive. It is unique among fast setting mercaptan cure epoxies in that it combines high shear strength with good peel performance properties. Scotch-Weld epoxy adhesive DP100 Plus Clear is transparent and slightly flexible when cured.
Available in bulk containers as 3M™ Scotch-Weld™ Epoxy Adhesive DP100 Plus B/A Clear.

Product Features

- 4 minute worklife
- High shear and peel strength
- Slightly flexible
- 1:1 mix ratio
- Recognized as meeting UL 94 HB

3M™ Scotch-Weld™ Epoxy Adhesive DP100 Plus 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	4000 to 11000 cP	3M C1d	80°F(27°C)	Procedure involves Brookfield RVF, #7 spindle, 20 rpm. Measurement taken after 1 minute rotation.
Accelerator Viscosity	7000 to 13000 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	9.7 to 9.9 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)	1:1			

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 3M™ Scotch-Weld™ Epoxy Adhesive DP100 Plus Clear when applied to properly prepared substrates, cured, and tested according to the specifications indicated. This data was generated using the 3M™ EPX™ Applicator System equipped with an EPX static mixer, according to manufacturer's directions. Thorough hand mixing should afford comparable results.

Elongation: 75 %

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
3500 lb/in²	Etched Aluminum
1800 lb/in²	Sanded Aluminum (60 grit)
1700 lb/in²	Cold Rolled Steel
700 lb/in²	Wood - Fir
250 lb/in²	Glass
300 lb/in²	Glass with 3M™ Scotch-Weld™ Primer EC3901
600 lb/in²	Polycarbonate (PC)
300 lb/in²	Acrylic (PMMA)
1500 lb/in²	Fiberglass Reinforced Plastic
280 lb/in²	ABS
450 lb/in²	Polyvinyl chloride (PVC)
80 lb/in²	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.

Environmental Resistance (OLS)	Dwell/Cure Time
3500 lb/in²	24 hr @ Room Temperature + 2 hr @ 160°F(71°C)
4500 lb/in²	24 hr @ Room Temperature + 2 hr @ 240°F(116°C)
3900 lb/in²	1 wk Room Temperature + 1 wk @ 90°F(32°C)/90% RH
4500 lb/in²	1 wk Room Temperature + 1 wk 248°F(120°C)
3500 lb/in²	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
3000 lb/in²	-67°F(-55°C)
3500 lb/in²	Room Temperature
750 lb/in²	120°F(49°C)
400 lb/in²	150°F(66°C)
200 lb/in²	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
2 lb/in width	-67°F(-55°C)
13 lb/in width	Room Temperature
15 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.

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
A	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

Table continued on next page

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 n 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	Notes	Method	Substrate
Exotherm max temp	128 °F	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	6 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 max temp	260 °F	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.		
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	

Table continued on next page

Typical Mixed Physical Properties (continued)

Property	Values	Test Condition	Notes	Method	Substrate
Worklife, 2g 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	
Worklife, 20g mixed	3 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	9 to 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
Time to Full Cure	48 h	Room Temperature	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.		

Rate of Strength Buildup (OLS)	Dwell/Cure Time
600 lb/in²	60 min
900 lb/in²	6 hr
1100 lb/in²	24 hr
2800 lb/in²	7 days
3400 lb/in²	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.

Typical Cured Characteristics

Property	Values	Method	Dwell/Cure Time	Notes	Test Condition
Tensile Strength	1850 lb/in²	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.	
Color	Clear				Cured
Shore D Hardness	65 to 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 (41°F) rise per minute.	241°F(116°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.	604°F(318°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™ EPX™ Pneumatic Applicator Delivery Rates

Pneumatic Applicator Delivery Rates	Test Condition
54 g/min	400 ml Applicator – Maximum Pressure 73 psi. 6mm Nozzle
206.5 g/min	400 ml Applicator – Maximum Pressure 73 psi. 10mm Nozzle
45.7 g/min	200 ml Applicator – Maximum Pressure 58 psi. 6mm Nozzle
179 g/min	200 ml Applicator – Maximum Pressure 58 psi. 10mm Nozzle
60 g/min	48.5/50 ml Applicator – Maximum Pressure 50 psi. 1/4 in. Nozzle

Property: Pneumatic Applicator Delivery Rates
notes: Tests were run at a temperature of 70°F ± 2°F (21°C ± 1°C) and at maximum applicator pressure.

Electrical and Thermal Properties

Glass Transition Temperature (Tg)		Test Condition
23 °C	73 °F	Onset
29 °C	84 °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		
.32 x10^-3 Cal/s/cm/°C	13.3 W/m/K	0.077 (btu-ft)/(h-ft²-°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	6.6	ASTM D150	1 KHz, Room Temperature	
Dissipation Factor	0.06	ASTM D150	1 KHz, Room Temperature	
Dielectric Strength	710 V/mil	ASTM D149		Sample Thickness Approx. 30 mil.
Volume Resistivity	6.7 × 10^11 Ω-cm	ASTM D257	Room Temperature	
Coefficient of Thermal Expansion	93 × 10^-6 m/m/°C		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	182 × 10^-6 m/m/°C		40-140°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 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.

Handling/Application Information (continued)

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 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 Adhesive DP100 Plus Clear is 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 ensure 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 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), in order to speed curing. These products will cure in 48 hours @ 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 methyl ethyl ketone (MEK).*
Adhesive Coverage: A 0.005 in thick bond line will yield a coverage of 320 sqft/gallon.
*Note: When using solvents, extinguish all ignition sources, including pilot lights, and follow manufacturer's precautions and directions for use.

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 190°F ± 10°F (88°C ± 5°C).
5. If primer is to be used, it should be applied within 4 hours after surface preparation.
Note: Read and follow component supplier's environmental health and safety information prior to preparing this etch 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.*
*Note: When using solvents, extinguish all ignition sources, including pilot lights, and follow manufacturer's precautions and directions for use.

3M™ Scotch-Weld™ Epoxy Adhesive DP100 Plus Clear

Storage and Shelf Life

Store 3M™ Scotch-Weld™ Epoxy Adhesive DP100 Plus 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 containers. Product shelf life is based on date of manufacture.

Industry Specifications

UL 94 HB

Trademarks

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

References

Safety Data Sheet (SDS)

https://www.3m.com/3M/en_US/company-us/SDS-search/results/?gsaAction=msdsSRA&msdsLocale=en_US&co=ptn&q=DP100 Plus 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.

Technical Information

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