

3M

Scotch-Weld™

Epoxy Adhesive

DP920

Technical Data

July, 2011

Product Description

3M™ Scotch-Weld™ Epoxy Adhesive DP920 is a two-part, 2:1 mix ratio, toughened epoxy structural adhesive with a 20 minute work life. It exhibits excellent shear and peel strengths along with good impact and durability; and bonds well to oily metal substrates with minimal surface preparation.

Features

- Minimal surface preparation
- Excellent shear and peel adhesion
- 20-minute work life
- Low odor (compared to most acrylic adhesives)
- Easy mixing
- 2:1 mix ratio

Typical Uncured Physical Properties

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

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

Product		3M™ Scotch-Weld™ Epoxy Adhesive DP920
Color	Base (B) Accelerator (A)	Off-white Yellow
Net Weight (lbs./gallon)	Base (B) Accelerator (A)	10.0 9.2
Viscosity ¹ @ 73°F (23°C)	Base (B) Accelerator (A)	110,000 cps 18,000 cps
Base Resin		Epoxy
Mix Ratio (B:A)	By volume By weight	2 : 1 2 : 0.92
Work Life ² @ 73°F (23°C)	Nozzle mixed	20 - 30 minutes
Time to Handling Strength ³		4 hours

¹Brookfield RVF Viscometer, #7 spindle at 20 rpm.

²Approximate time during which material can remain in a mixer nozzle and still be expelled without undue force on the applicator.

³Time to achieve approximate 50 psi Overlap Shear Strength (OLS) when cured at (73°F) 23°C.

Note: The data in this sheet were generated using the 3M™ EPX™ Applicator System equipped with an EPX static mixer, according to manufacturer's directions. Thorough hand-mixing will afford comparable results.

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Typical Cured Properties

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

Product	3M™ Scotch-Weld™ Epoxy Adhesive DP920
Physical	
Color	Pale Yellow
Full Cure Time	48 hours @ 73°F (23°C)
Shore D Hardness	70-75
Electrical	
Dielectric Strength (ASTM D149)	496 volts/mil
Volume Resistivity (ASTM D257)	8.4 x 10 ¹⁴ ohm-cm

Typical Adhesive Performance Characteristics

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

Overlap Shear, (OLS) to Various Metals (PSI) (ASTM D1002) Tested @ 73°F (23°C)

Substrate	Scotch-Weld Epoxy Adhesive DP920
Aluminum – etched	4000 CF
Aluminum – etched; with KTLN Deep Draw Lube Oil	3360 CF
Cold-Rolled Steel – MEK/abrade/MEK	2700 CF
Cold-Rolled Steel – with Multidraw KTL N16 Deep Draw Lube Oil	2200 CF/AF
Cold-Rolled Steel – with Preton R303 PX2	2200 CF/AF
Cold-Rolled Steel – with Ferrocote 6130 Draw Lube	2400 CF/AF
Copper (MEK/abrade/MEK)	3100 CF/AF
Brass (MEK/abrade/MEK)	3800 CF/AF
Stainless Steel (MEK/abrade/MEK)	3500 CF/AF
Galvanized Aluminum (MEK/abrade/MEK)	2300 AF

AF: adhesive failure CF: cohesive failure SF: substrate failure

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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, (OLS) to Various Plastics (PSI) (ASTM D1002) Tested @ 73°F (23°C)

Substrate	3M™ Scotch-Weld™ Epoxy Adhesive DP920
Acrylic (PMMA) (IPA/abrade/IPA)	410 AF
PVC (IPA/abrade/IPA)	720 AF/SF
Polycarbonate (IPA/abrade/IPA)	540 AF
ABS (IPA/abrade/IPA)	590 AF
Polystyrene (HIPS) (IPA/abrade/IPA)	480 AF/SF
FRP (Green) (IPA/abrade/IPA)	3400 AF/CF
Phenolic (IPA/abrade/IPA)	1500 SF

AF: adhesive failure CF: cohesive failure SF: substrate failure

Environmental Resistance, Aluminum (Etched), Measured by Overlap Shear Tested @ 73°F (23°C) (PSI) (ASTM D1002)

Environment	Condition	Scotch-Weld Epoxy Adhesive DP920
Control	73°F (23°C)/50% RH; 30 days	4800 CF
DI Water	73°F (23°C), 30 days immersion	4500 CF
Heat and Humidity	150°F (65°C)/80% RH; 30 days	3700 CF
Salt Spray	5% salt solution; 14 days	3600 CF
Methyl Ethyl Ketone	73°F (23°C), 30 days immersion	3500 CF
Isopropanol	73°F (23°C), 30 days immersion	4000 CF
Gasoline	73°F (23°C), 30 days immersion	3500 CF
Diesel Fuel	73°F (23°C), 30 days immersion	4800 CF
50% Antifreeze	73°F (23°C), 30 days immersion	4700 CF
10W30 Motor Oil	73°F (23°C), 30 days immersion	4500 CF
Heat	80°C; 30 days	4900 CF
Cycle	-40°C/38°C and 100% relative humidity/90°C; 30 days	4500 CF

CF: cohesive failure

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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.

Aluminum, Overlap Shear, at Temperature (PSI)

Temperature	3M™ Scotch-Weld™ Epoxy Adhesive DP920
-67°F (-55°C)	3800
73°F (23°C)	4000
180°F (82°C) [15 min.] ¹	800
180°F (82°C) [30 min.] ¹	800
180°F (82°C) [60 min.] ¹	850
180°F (82°C) [4 hr.] ¹	950
250°F (121°C) [15 min.] ¹	500

¹Represents time in test chamber oven before test.

Bell Peel Adhesion, Aluminum (Etched), (PIW) at Temperature (ASTM D3167)

Substrate	Scotch-Weld Epoxy Adhesive DP920
-67°F (-55°C)	20 CF
73°F (23°C)	32 CF
180°F (82°C)	7 AF

AF: adhesive failure CF: cohesive failure SF: substrate failure

Bell Peel Adhesion (PIW) (ASTM D3167)

Substrate	Scotch-Weld Epoxy Adhesive DP920
Aluminum – etched	32 CF
Aluminum – etched; with KTL N16 Deep Draw Lube Oil	30 CF
Cold-Rolled Steel – with KTL N16 Deep Draw Lube Oil	23 CF

CF: cohesive failure

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Typical Curing Characteristics

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

Rate of Strength Build-Up Aluminum, Overlap Shear (PSI) (ASTM D1002) Bonds Tested at 73°F (23°C)

Time in Oven	Cure Temperature		
	73°F (23°C)	120°F (49°C)	140°F (60°C)
30 Minutes		25	80
1 Hour		2600	4200
2 Hours	1	4600	5800
3 Hours	5	5700	
5 Hours	760		
6 Hours	950		
24 Hours	4600		

Substrates and Testing

Overlap Shear (ASTM D1002)

Overlap Shear (ASTM D-1002, 3M Test Method C-236) strength was measured on 1" wide x 1/2" overlap specimen. These bonds were made individually using 1" x 4" pieces of substrates except for Aluminum. Two panels 0.063 in. thick, 4 in. x 7y in of 2024T-3 clad aluminum were bonded and cut into 1 in. wide samples after 24 hours. The thickness of the adhesive bond line was approximately 0.005". All strengths were measured at 73°F (23°C) except when noted.

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.; rubbers, 0.125in.; plastics, 0.125 in. and samples were allowed to cure at 75°F (24°C) and approximately 50% RH for 1 week before tested. The separation rate of the testing jaws was 0.1 inch per minute for metals and 2 inches per minute for plastics.

A. Bell Peel (ASTM D3167)

Bell peel strengths were measured on 1/2 in. wide bonds at the temperatures noted. The testing jaw separation rate was 6 in. per minute. The bonds were made with 0.064 in. bonded to 0.025 in. thick adherends.

B. Cure Cycle

With the exception of Rate of Strength Build-Up Tests, all bonds were cured 7 days at 73°F (23°C) at 50% RH before testing or subjected to further conditioning or environmental aging.

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Handling/Curing 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. The amount of surface preparation depends on the required bond strength, environmental aging resistance desired by user. For suggested surface preparations on common substrates, see the section on surface preparation.

2. Mixing

For Duo-Pak Cartridges

3M™ Scotch-Weld™ Epoxy Adhesive DP920 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 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 adhesive. For hand mixing, expel the desired amount of adhesive and mix thoroughly. Mix approximately 15 seconds after a uniform color is obtained.

For Bulk Containers

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

3. For maximum bond strength, apply adhesive evenly to both surfaces to be joined.
4. Application to the substrates should be made within 15-20 minutes. Larger quantities and/or higher temperatures will reduce this working time.
5. Join the adhesive coated surfaces and allow to cure at 60°F (16°C) or above until completely firm. Heat up to 120°F - 150°F (49°C - 66°C) will speed curing.
6. Keep parts from moving during cure. Apply contact pressure if necessary. Maximum shear strength is obtained with a 3-5 mil bond line.
7. 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.

Surface Preparation

3M™ Scotch-Weld™ Epoxy Adhesive DP920 is designed to be used on oiled metal surfaces.

Since each oiled metal surface combination may be unique, it is suggested that the specific oiled metal combination be reviewed prior to use.

Please contact 3M™ Technical Service @ 800-362-3550 for further assistance.

3M™ Scotch-Weld™ Epoxy Adhesive DP920

Storage	Store product in cool, dry area where temperature will not exceed 70°F (21°C).
Shelf Life	3M™ Scotch-Weld™ Epoxy Adhesive DP920 has a shelf life of 15 months in unopened original containers kept at recommended storage conditions.
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.
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ISO 9001:2008

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Industrial Adhesives and Tapes Division

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