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February, 2019

3M™ Scotch-Weld™ Epoxy Adhesive DP420 Black

Product Description

3M™ Scotch-Weld™ Epoxy Adhesives are high performance, two-part epoxy adhesives offering outstanding shear and peel adhesion, and very high levels of durability.

Product Features

- High shear strength
- High peel strength
- Outstanding environmental performance
- Easy mixing
- 20 minute worklife

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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	Notes
Base Color	Black	
Accelerator Color	Amber	
Base Viscosity	20000 to 50000 cP	Viscosity measured using cone-and-plate viscometer; reported viscosity at 4 sec^-1 shear rate.
Accelerator Viscosity	8000 to 14000 cP	Viscosity measured using cone-and-plate viscometer; reported viscosity at 4 sec^-1 shear rate.
Base Resin	Epoxy	
Accelerator Resin	Amine	
Base Net Weight	9.3 to 9.7 lb/gal	
Accelerator Net Weight	9.0 to 9.4 lb/gal	
Mix Ratio by Volume (B:A)	2:1	
Mix Ratio by Weight (B:A)	2:0.97	

Typical Mixed Physical Properties

Property	Values	Test Condition
Worklife, 20g mixed	15 min	Room Temperature
Worklife, 10g mixed	20 min	Room Temperature
Worklife, 5g mixed	30 min	Room Temperature

Typical Cured Characteristics

Property	Values	Test Condition	Method
Color	Black	Cured	
Shore D Hardness	75 to 80	Room Temperature	ASTM D2240

Typical Performance Characteristics

Bell Peel	Test Condition
20 lb/in width	-67°F(-55°C)
82 lb/in width	Room Temperature
18 lb/in width	180°F(82°C)

Property: Bell Peel
Method: ASTM D3167
Substrate: Aluminum
notes: 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 are made with 0.064 in. bonded to 0.025 in. thick adherends.

Typical Curing Characteristics (OLS)	Dwell/Cure Time
300 lb/in²	2 hr @ Room Temperature
800 lb/in²	3 hr @ Room Temperature
3000 lb/in²	5 hr @ Room Temperature
3700 lb/in²	6 hr @ Room Temperature
4500 lb/in²	24 hr @ Room Temperature
2300 lb/in²	30 min @ 120°F(49°C)*
4700 lb/in²	60 min @ 120°F(49°C)*
3200 lb/in²	15 min @ 140°F(60°C)*
4700 lb/in²	60 min @ 140°F(60°C)*

Property: Typical Curing Characteristics (OLS)
Method: ASTM D1002
Test Condition : Room Temperature
Substrate: Aluminum
Substrate Notes: 7mil bondline
notes: The data in this data 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. *This represents the oven temperature to which the bonds were subjected for the prescribed time. The average bondline temperature during the cure time will be somewhat lower than the oven temperature.

Overlap Shear Strength	Substrate	Surface Preparation	Failure mode
2500 lb/in²	Aluminum	MEK/Abrade/MEK	
2200 lb/in²	Cold Rolled Steel	MEK/Abrade/MEK	
5000 lb/in²	Copper	MEK/Abrade/MEK	
2800 lb/in²	Brass	MEK/Abrade/MEK	
1800 lb/in²	Stainless Steel	MEK/Abrade/MEK	
450 lb/in²	ABS	IPA Wipe	
550 lb/in²	ABS	IPA Wipe/Abrade/IPA Wipe	
400 lb/in²	Polyvinyl chloride (PVC)	IPA Wipe	SF
360 lb/in²	Polyvinyl chloride (PVC)	IPA Wipe/Abrade/IPA Wipe	SF

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Typical Performance Characteristics (continued)

Overlap Shear Strength	Substrate	Surface Preparation	Failure mode
440 lb/in²	Polycarbonate (PC)	IPA Wipe	
450 lb/in²	Polycarbonate (PC)	IPA Wipe/Abrade/IPA Wipe	
190 lb/in²	Acrylic (PMMA)	IPA Wipe	
450 lb/in²	Acrylic (PMMA)	IPA Wipe/Abrade/IPA Wipe	
600 lb/in²	Fiberglass Reinforced Plastic	IPA Wipe	
1100 lb/in²	Fiberglass Reinforced Plastic	IPA Wipe/Abrade/IPA Wipe	SF

Property: Overlap Shear Strength
Method: ASTM D1002
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 except for aluminum. Two panels 0.063 in. thick, 4 in. x 7 in. of 2024T-3 clad aluminum were bonded and cut into 1 in. wide samples after 24 hours. 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, 0.125 in.; plastics, 0.125 in. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)

T-Peel Adhesion	Test Condition	Substrate	Substrate Notes	Surface Preparation
9.3 lb/in width	-67°F(-55°C)	Aluminum	0.032in thick	
50 lb/in width	Room Temperature	Aluminum	0.032in thick	
20 lb/in width	180°F(82°C)	Aluminum	0.032in thick	
60 lb/in width	Room Temperature	Etched Aluminum	0.032in thick; 17 - 20 mil bondline	
50 lb/in width	Room Temperature	Etched Aluminum	0.032in thick; 5- 8 mil bondline	
40 lb/in width	Room Temperature	Cold Rolled Steel	0.032in thick; 17 - 20 mil bondline	Oakite degrease
25 lb/in width	Room Temperature	Cold Rolled Steel	0.032in thick; 17 - 20 mil bondline	MEK/Abrade/MEK

Property: T-Peel Adhesion
Method: ASTM D1876
notes: T-peel strengths were measured on 1 in. wide bonds. The testing jaw separation rate was 20 inches per minute.

3M™ EPX™ Pneumatic Applicator Delivery Rates

Property	Values	Test Condition	Notes
Pneumatic Applicator Delivery Rates, 6mm Nozzle	29.6 lb/in²	Room Temperature	200 ml Applicator – Maximum Pressure 58 psi; Tests were run at maximum applicator pressure.
Pneumatic Applicator Delivery Rates, 10mm Nozzle	113 lb/in²	Room Temperature	200 ml Applicator – Maximum Pressure 58 psi; Tests were run at maximum applicator pressure.

Electrical and Thermal Properties

Property	Values	Method	Test Condition
Volume Resistivity	1.6 × 10^15 Ω-cm	ASTM D257	Room Temperature
Coefficient of Thermal Expansion	80 × 10^-6 m/m/°C		Below Tg
Coefficient of Thermal Expansion	194 × 10^6 m/m/°C		Above Tg

Handling/Application Information

Directions for Use

3M™ Scotch-Weld™ Epoxy Adhesive DP420 is supplied in dual syringe plastic duo- pak cartridges as part of the 3M™ EPX™ Applicator System. The duo-pak cartridges are supplied in 50 ml, 200 ml and 400 ml configurations. To use the EPX cartridge system simply insert the duo-pak cartridge into the EPX applicator. 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 simultaneous mixing of Part A and Part B is desired, attach the EPX mixing nozzle to the duo-pak cartridge and begin dispensing the adhesive.
When mixing Part A and Part B manually the components must be mixed in the ratio indicated in the typical uncured properties section of this data sheet. Complete mixing of the two components is required to obtain optimum properties.
Two-part mixing/proportioning/dispensing equipment is available for intermittent or production line use. These systems are ideal for line uses because of their variable shot size and flow rate characteristics and are adaptable to most applications.
Apply adhesive to clean, dry surfaces, joint parts and secure until adhesive sets (see rate of strength build up).

Handling/Application Information (continued)

Surface Preparation

The following surface preparations were used for substrates described in this Technical Data Sheet.
A. Aluminum Etch - Optimized FPL Etch - 3M (test method C-2803)
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 (3M test method C-2802).
2. Optimized FPL Etch Solution (1 liter):
Material Amount
Distilled Water 700 ml plus balance of liter (see below)
Sodium Dichromate 28 to 67.3 grams
Sulfuric Acid 287.9 to 310.0 grams
Aluminum Chips 1.5 grams/liter of mixed solution
To prepare 1 liter of this solution, dissolve sodium dichromate in 700 ml of distilled water. Add sulfuric acid and mix well. Add additional distilled water to fill to 1 liter. Heat mixed solution to 66 to 71°C (150 to 160°F). Dissolve 1.5 grams of 2024 bare aluminum chips per liter of mixed solution. Gentle agitation will help aluminum dissolve in about 24 hours.
To FPL etch panels, place them in the above solution at 150 to 160°F (66 to 71°C) for 12 to 15 minutes.
Note: Review and follow precautionary information provided by chemical suppliers prior to preparation of this etch solution.
3. Rinse immediately in large quantities of clear running tap water.
4. Dry – air dry approximately 15 minutes followed by force dry at 140°F (60°C) maximum for 10 minutes (minimum).
5. Both surface structure and chemistry play a significant role in determining the strength and permanence of bonded structures. It is therefore advisable to bond or prime freshly primed clean surfaces as soon as possible after surface preparation in order to avoid contamination and/or mechanical damage. Please contact your 3M sales representative for primer recommendations.
B. Oakite Degrease
Oakite 164 solutions (9-11 oz./gallon of water) at 190°F ± 10°F (88°C ± 5°C) for 2 minutes. Rinse immediately in large quantities of cold running water.
C. MEK/Abrade/MEK
Wipe surface with a methyl ethyl ketone (MEK) soaked swab, abrade and wipe with a MEK soaked swab.* Allow solvent to evaporate before applying adhesive.
*Note: When using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer's precautions and directions for use.
D. Isopropyl Alcohol Wipe Only Surface Preparation
Wipe surface with an isopropyl alcohol soaked swab.* Allow solvent to evaporate before applying adhesive.
*Note: When using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer's precautions and directions for use.
E. Isopropyl Alcohol/Abrade/Isopropyl Alcohol Surface Preparation
Wipe surface with an isopropyl alcohol soaked swab, abrade using clean fine grit abrasives, and wipe with an isopropyl alcohol soaked swab.* Then allow solvent to evaporate before applying adhesive.
*Note: When using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer's precautions and directions for use.

Storage and Shelf Life

Store products at 60-80°F (15-27°C) for maximum shelf life.
These products have a shelf life of 24 months from date of manufacture in original containers at room temperature.

Trademarks

References

Property	Values
3m.com Product Page	https://www.3m.com/3M/en_US/company-us/all-3m-products/~/3M-Scotch-Weld-Epoxy-Adhesive-DP420?N=5002385+3293242436&rt=rud

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References (continued)

Property	Values
Safety Data Sheet (SDS)	https://www.3m.com/3M/en_US/company-us/SDS-search/results/?gsaAction=msdsSRA&msdsLocale=en_US&co=ptn&q=DP420 Black

Family Group

	DP420 Black	DP420NS Black	DP420 Off White
Color Test Condition: Cured	Black		Opaque, off-white
Shore D Hardness Test Condition: Room Temperature	75 to 80		75 to 80

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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