English-EU

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Technical Data Sheet

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

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

Attribute Name	Value
Color	Black [1]
Mix Ratio by Volume (B:A)	2:1
Mix Ratio by Weight (B:A)	2:0.97

[1] Colors may vary from nearly white to yellow/amber. Adhesive performance is not affected by color variation.

Attribute Name	Temperature	Value
Base Color		Black
Accelerator Color		Amber
Base Resin		Epoxy
Accelerator Resin		Amine
Base Net Weight		1.11 — 1.16 g/cm³
Accelerator Net Weight		1.08 — 1.13 g/cm³
Base Viscosity	23 °C	20000 — 50000 cP [1]
Accelerator Viscosity	23 °C	8000 — 14000 cP [1]

[1] Viscosity measured using cone-and-plate viscometer; reported viscosity at 4 sec^{-1} shear rate.

Typical Mixed Physical Properties

Attribute Name	Temperature	Value
Open Time		20 min [1]
Worklife, 5g mixed	23 °C	30 min
Worklife, 10g mixed	23 °C	20 min
Worklife, 20g mixed	23 °C	15 min

[1] Max time allowed after applying adhesive to a substrate before bond must be closed and fixed. Cure times approximate and depend on adhesive temperature. Hotmelts: The approx. bonding range of a 3.2 mm (1/8 in) bead of molten adhesive on a non-metallic surface.

Typical Physical Properties

Attribute Name	Value
Cured Color	Black

Typical Cured Characteristics

Temperature: 23 °C

Attribute Name	Test Method	Value
Shore D Hardness	ASTM D2240	77 (85)

Typical Performance Characteristics

Overlap Shear Strength

Temperature: 23 °C
Dwell Time: 7 d
Test Method: ASTM D1002, ISO 4587

Substrate	Surface Prep	Value
Aluminum	MEK/Abrade/MEK	17 MPa [1]
Cold Rolled Steel	MEK/Abrade/MEK	15 MPa [1]
Stainless Steel	MEK/Abrade/MEK	12 MPa [1]
Copper	MEK/Abrade/MEK	35 MPa [1]
Brass	MEK/Abrade/MEK	19 MPa [1]
ABS	IPA Wipe/Abrade/IPA Wipe	3.8 MPa [1]
Polycarbonate (PC)	IPA Wipe/Abrade/IPA Wipe	3.1 MPa [1]
Acrylic (PMMA)	IPA Wipe/Abrade/IPA Wipe	3.1 MPa [1]
Fiber-Reinforced Plastic	IPA Wipe/Abrade/IPA Wipe	7.6 MPa [1]
Polyvinyl chloride (PVC)	IPA Wipe/Abrade/IPA Wipe	2.8 MPa [1]

[1] 25 mm (1") wide, 12.7 mm (1/2") overlap samples, 25 mm (1") x 102 mm (4") substrates, bondline thickness: 0.13-0.20 mm (5-8 mil)
Separation rate 2.5 mm/min (0.1 in/min) metal, 51 mm/min (2 in/min) plastic, 510 mm/min (20 in/min) rubber.
Substrate thickness: steel 1.5 mm (60 mil), other metal 1.3-1.6 mm (50-64 mil), rubber and plastic 3.2 mm (125 mil)
Cohesive Failure (CF), Adhesive Failure (AF), Mixed Failure (MF), Substrate Failure (SF)

Bell Peel

Substrate: Aluminum
Test Method: ASTM D3167

Temperature	Value
-55 °C	35 N/cm [1]
23 °C	144 N/cm [1]
82 °C	32 N/cm [1]

[1] 12.7 mm (0.5 in) wide bonds. Jaw separation 15 cm/min (6 in/min). 0.64 mm (0.025 in) thick substrate. 1.6 mm (0.064 in) bondline

Typical Curing Characteristics (OLS)

Substrate: Aluminum
Test Method: ASTM D1002, ISO 4587

Dwell Time	Temperature	Value
2 h	23 °C	2.1 MPa [1]
3 h	23 °C	5.5 MPa [1]
5 h	23 °C	21 MPa [1]
6 h	23 °C	26 MPa [1]

Dwell Time	Temperature	Value
24 h	23 °C	31 MPa [1]
30 min	49 °C	16 MPa [1]
60 min	49 °C	32 MPa [1]
15 min	60 °C	22 MPa [1]
60 min	60 °C	32 MPa [1]

[1] Generated using 3M™ EPX™ Applicator System with an EPX static mixer according to mfr directions. Thorough hand-mixing will give comparable results. 0.18 mm (7 mil) bondline
*Avg bondline temperature during cure time is lower than oven temp.

T-Peel Adhesion

Test Method: ASTM D1876

Temperature	Substrate	Surface Prep	Value
-55 °C	Aluminum		16 N/cm [1]
23 °C	Aluminum		88 N/cm [1]
23 °C	Cold Rolled Steel	Oakite degrease	70 N/cm [1]
23 °C	Cold Rolled Steel	MEK/Abrade/MEK	44 N/cm [1]
23 °C	Etched Aluminum		105 N/cm [2]
23 °C	Etched Aluminum		88 N/cm [3]
82 °C	Aluminum		35 N/cm [1]

[1] T-peel strengths were measured on 25 mm (1 in) wide bonds. The testing jaw separation rate was 508 mm/min (20 in/min).

[2] T-peel strengths were measured on 25 mm (1 in) wide bonds. The testing jaw separation rate was 508 mm/min (20 in/min). 0.81 mm (0.032 in) thick substrate; 0.43 - 0.51 mm (17 - 20 mil) bondline

[3] T-peel strengths were measured on 25 mm (1 in) wide bonds. The testing jaw separation rate was 508 mm/min (20 in/min). 0.81 mm (0.032 in) thick substrate; 13 - 20 µm (0.005 - 0.008 in) bondline.

Electrical and Thermal Properties

Coefficient of Thermal Expansion

Test Condition	Value
Below Tg	80 x 10^{-6} m/m/°C
Above Tg	194 x 10^{6} m/m/°C

Temperature: 23 °C

Attribute Name	Test Method	Value
Volume Resistivity	ASTM D257	1.6 x 10^{15} Ω-cm

3M™ EPX™ Pneumatic Applicator Delivery Rates

Pneumatic Applicator Delivery Rates

Test Condition	Value
200 ml Applicator – Maximum Pressure 58 psi. 6 mm Nozzle	0.2 MPa [1]
200 ml Applicator – Maximum Pressure 58 psi. 10 mm Nozzle	0.8 MPa [1]

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

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).

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 under normal conditions of 16° to 27°C (60° to 80°F) and 40 to 60% relative humidity in the original packaging, out of direct sunlight. For best performance, use this product within 24 months from date of manufacture.

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

Automotive Disclaimer

Select Automotive Applications:
This product is an industrial product and has not been designed or tested for use in certain automotive applications, such as automotive electric powertrain battery or high voltage applications, which may require the product to be manufactured in a IATF certified facility, meet a Ppk of 1.33 for all properties, undergo an automotive production part approval process (PPAP), or fully adhere to automotive design or quality system requirements (e.g., IATF 16949 or VDA 6.3). Customer assumes all responsibility and risk if customer chooses to use this product in these applications.

Information

Precautionary Information: Refer to product label and Material Safety Data Sheet for health and safety information before using the product. For information, please contact your local 3M Office. You can click or scan QR code to see contact detail or visit www.3M.com Important Information: All statements, technical information and recommendations contained in this document are based upon tests or experience that 3M believes are reliable. However, many factors beyond 3M's control can affect the use and performance of a 3M product in a particular application, including the conditions under which the product is used and the time and environmental conditions in which the product is expected to perform. Since these factors are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for the user's method or application. All questions of liability relating to this product are governed by the terms of the sale subject, where applicable, to the prevailing law. Values presented have been determined by standard test methods and are average values not to be used for specification purposes. Our recommendations on the use of our products are based on tests believed to be reliable but we would ask that you conduct your own tests to determine their suitability for your applications. This is because 3M cannot accept any responsibility or liability direct or consequential for loss or damage caused as a result of our recommendations.

ISO Statement

This product was manufactured under a 3M quality system registered to ISO 9001 standards.

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