SNAPSHOOT
ENGINEERED FOR A SAFER TOMORROW

현장을 이해하고, 필요한 솔루션을 연결합니다.

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제품 제안부터 공급·시공·설치·교육까지



COMPANY INFORMATION

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TECHNICAL DOCUMENTS

인증서 · 데이터시트 · 기술자료

제품의 규격과 성능, 인증 및 적용 조건을 확인하기 위한 자료입니다.

ABOUT SNAPSHOOT

제품 공급을 넘어, 현장에 맞는 해결책으로

스냅슛은 산업현장의 작업 환경과 요구 조건을 바탕으로
적합한 제품과 시스템을 제안합니다. 현장 실사를 통해 설치 조건을 확인하고,
공급부터 시공·설치 및 사용 교육까지 필요한 과정을 함께합니다.

추락방지 시스템

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산업용 테이프 · 접착제 · 기능성 소재
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Technical Data Sheet

3M™ Scotch-Weld™ Epoxy Adhesive DP460
Off White

Additional Info

Regulatory Info/SDS

Product Description

3M™ Scotch-Weld™ Epoxy Adhesive DP460 Off-White is a high performance, two-part epoxy adhesive offering outstanding shear and peel adhesion, and very high levels of durability.

Product Features

- High shear strength
- 60 minute work life
- Easy mixing
- High peel strength
- Recognized as meeting UL 94 HB

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
Mix Ratio by Volume (B:A)	2:1
Mix Ratio by Weight (B:A)	2:0.96

Attribute Name	Temperature	Value
Base Color		White
Accelerator Color		Amber
Base Resin		Epoxy
Accelerator Resin		Amine
Abrasive Filler		None
Base Net Weight		1.11 — 1.16 g/cm³ (9.3 — 9.7 lb/gal)
Accelerator Net Weight		1.05 — 1.1 g/cm³ (8.8 — 9.2 lb/gal)
Base Viscosity	23 °C (73 °F)	20,000 — 50,000 cP
Accelerator Viscosity	23 °C (73 °F)	8,000 — 16,000 cP

Typical Mixed Physical Properties

Rate of Strength Buildup

Substrate: Etched Aluminum
Temperature: 23 °C (73 °F)
Test Method: ASTM D1002, ISO 4587

Dwell Time	Value
6 h	6.9 MPa (1000 lb/in²) [1]
24 h	28 MPa (4000 lb/in²) [1]

[1] 25 mm (1 in) wide 12.7 mm (0.5 in) overlap specimens with 25 mm x 102 mm (1 in x 4 in) substrates. 13 - 20 µm (0.005-0.008 in) bondline.
Jaw separation 2.5 mm/min (0.1 in/min)
Substrate thickness 1.3 - 1.6 mm (0.05-0.064 in)
Cohesive (CF), Adhesive (AF), Substrate (SF) Failure

Attribute Name	Temperature	Value
Open Time		60 min [1]
Time to Handling Strength	23 °C (73 °F)	4 h
Worklife, 5g mixed	23 °C (73 °F)	90 min
Worklife, 10g mixed	23 °C (73 °F)	75 min
Worklife, 20g mixed	23 °C (73 °F)	60 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	Off-White

Typical Cured Characteristics

Temperature: 23 °C (73 °F)

Attribute Name	Test Method	Value
Shore D Hardness	ASTM D2240	77

Typical Performance Characteristics

Overlap Shear Strength

Temperature: 23 °C (73 °F)
Dwell Time: 7 d
Test Method: ASTM D1002, ISO 4587

Substrate	Surface Prep	Value
Aluminum	MEK/Abrade/MEK	24 MPa (3500 lb/in²) [1]
Cold Rolled Steel	MEK/Abrade/MEK	19 MPa (2800 lb/in²) [1]
Stainless Steel	MEK/Abrade/MEK	28 MPa (4000 lb/in²) [1]
Copper	MEK/Abrade/MEK	28 MPa (4000 lb/in²) [1]
ABS	IPA Wipe/Abrade/IPA Wipe	4 MPa (575 lb/in²) [1]
Polycarbonate (PC)	IPA Wipe/Abrade/IPA Wipe	3.4 MPa (500 lb/in²) [1]
Acrylic (PMMA)	IPA Wipe/Abrade/IPA Wipe	2.3 MPa (330 lb/in²) [1]
Fiber-Reinforced Plastic	IPA Wipe/Abrade/IPA Wipe	6.9 MPa (1000 lb/in²) (SF) [1]
Polyvinyl chloride (PVC)	IPA Wipe/Abrade/IPA Wipe	3.4 MPa (500 lb/in²) [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)

T-Peel Adhesion

Test Method: ASTM D1876

Temperature	Substrate	Surface Prep	Value
-55 °C (-67 °F)	Aluminum		9 — 18 N/cm (5 — 10 lb/in) [1]
23 °C (73 °F)	Aluminum		105 N/cm (60 lb/in) [1]
23 °C (73 °F)	Cold Rolled Steel	Oakite degrease	70 N/cm (40 lb/in) [1]
23 °C (73 °F)	Cold Rolled Steel	MEK/Abrade/MEK	44 N/cm (25 lb/in) [1]

Temperature	Substrate	Surface Prep	Value
23 °C (73 °F)	Etched Aluminum		105 N/cm (60 lb/in) [2]
23 °C (73 °F)	Etched Aluminum		88 N/cm (50 lb/in) [3]
82 °C (180 °F)	Aluminum		5 — 9 N/cm (3 — 5 lb/in) [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	59 x 10^{-6} m/m/°C
Above Tg	159 x 10^{-6} m/m/°C

Temperature: 23 °C (73 °F)

Attribute Name	Test Method	Value
Volume Resistivity	ASTM D257	2.4 x 10^{14} 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	31.1 g/min [1]
200 ml Applicator – Maximum Pressure 58 psi. 10 mm Nozzle	132 g/min [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 Adhesives DP460 Off-White 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 50 ml cartridge 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 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.

With the 200 ml and 400 ml cartridges, the nozzle must be attached before dispensing any material to prevent unmixed adhesive from getting into the applicator cartridge holder. A small quantity of material should be discarded until uniform color, consistency of product and even flow is evident.

When mixing Part A and Part B manually, the components must be mixed in the ratio indicated in the typical uncured properties section. 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.

Viscosity/Rheology

Adding graphs here



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.

D. Isopropyl Alcohol Wipe
Wipe surface with an isopropyl alcohol soaked swab.* Allow solvent to evaporate before applying adhesive.

E. Isopropyl Alcohol/Abrade/Isopropyl Alcohol
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.

Purge Recommendation

For short purge times between runs the graph below shows the mixed viscosity of DP460 over time, based on static mixer and purge volume use this graph for a recommended purge time. For a one component purge using bulk dispensers, purge with DP460 Part B.



Equipment Cleaning

Excess uncured adhesive can be cleaned with methyl ethyl ketone (MEK). Follow equipment manufacturing procedures for cleaning of their equipment.

Industry Specifications

UL 94 HB
NFPA 130 test report details (ASTM E162, ASTM E662, BSS 7239, SMP 800-C)

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.

Available Sizes

Attribute Name	Value
200*/400ml	Mixpac C system [1]
45-50ml	Mixpac B system
5-gallon Pail	Straight sided, I.D. of 341mm x 286mm
55-gallon Drum	Straight Sided, Diameter 603mm x Height 884mm

[1] *where available

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.

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ISO Statement

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

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