

Technical Data Sheet

3M™ Scotch-Weld™ Epoxy Adhesive DP460NS

Product Description

3M™ Scotch-Weld™ Epoxy Adhesive DP460NS 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
- Non sag (DP460NS)





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 Mixed Physical Properties

Property	Values	Additional Information
Open Time (min)	60 min	View 

Notes: 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 1/8" bead of molten adhesive on a non-metallic surface.

Worklife, 20g mixed	60 min	View 
Temp C: 23C Temp F: 73F		
Worklife, 10g mixed	60 min	View 
Temp C: 23C Temp F: 73F		
Worklife, 5g mixed	60 min	View 
Temp C: 23C Temp F: 73F		
Time to Full Cure	4 hr	View 

Temp C: 23C
Temp F: 73F

Notes: 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.

Time to Full Cure


24 hr

View 

Temp C: 23C
Temp F: 73F

Rate of Strength Buildup 2hr

1 lb/in²

View 

Test Method: ASTM D1002

Test Name: Overlap Shear Strength
Dwell/Cure Time: 2.0
Dwell Time Units: hr
Temp C: 23C
Temp F: 72F
Substrate: Etched Aluminum

Notes: 1 in wide 1/2 in overlap specimens with 1 in x 4 in substrates. 0.005-0.008in bondline. Jaw separation 0.1 in/min. Substrate thickness 0.05-0.064 in

Rate of Strength Buildup 4hr

46 lb/in²

View 

Test Method: ASTM D1002

Test Name: Overlap Shear Strength
Dwell/Cure Time: 4.0
Dwell Time Units: hr
Temp C: 23C
Temp F: 72F
Substrate: Etched Aluminum

Notes: 1 in wide 1/2 in overlap specimens with 1 in x 4 in substrates. 0.005-0.008in bondline. Jaw separation 0.1 in/min. Substrate thickness 0.05-0.064 in

Rate of Strength Buildup 6hr

970 lb/in²

View 

Test Method: ASTM D1002

Test Name: Overlap Shear Strength
Dwell/Cure Time: 6.0
Dwell Time Units: hr
Temp C: 23C
Temp F: 72F
Substrate: Etched Aluminum

Notes: 1 in wide 1/2 in overlap specimens with 1 in x 4 in substrates. 0.005-0.008in bondline. Jaw separation 0.1 in/min. Substrate thickness 0.05-0.064 in

Rate of Strength Buildup 1day

4500 lb/in²


View 

Test Method: ASTM D1002



Test Name: Overlap Shear Strength
Dwell/Cure Time: 1.0
Dwell Time Units: day
Temp C: 23C
Temp F: 72F
Substrate: Etched Aluminum

Notes: 1 in wide 1/2 in overlap specimens with 1 in x 4 in substrates. 0.005-0.008in bondline. Jaw separation 0.1 in/min. Substrate thickness 0.05-0.064 in


Typical Physical Properties

Property	Values	Additional Information
Color	Off-White	View 
Test Name: Cured		

Typical Uncured Physical Properties

Property	Values	Additional Information
Base Color	White	
Accelerator Color	Amber	
Base Viscosity	150,000 - 275,000 cP	View 
Temp C: 23C Temp F: 72F		
Accelerator Viscosity	8,000 - 14,000 cP	View 
Temp C: 23C Temp F: 72F		
Base Resin	Epoxy	
Accelerator Resin	Amine	
Base Net Weight	9.3 to 9.7 lb/gal	
Accelerator Net Weight	8.8 to 9.2 lb/gal	
Mix Ratio by Volume (B:A)	2:1	
Mix Ratio by Weight (B:A)	2:0.96	

Typical Cured Characteristics

Property	Values	Additional Information
Shore D Hardness	81	View 
Test Method: ASTM D2240		
Temp C: 23C Temp F: 73F		

Typical Performance Characteristics

Property	Values	Additional Information
Bell Peel	19 lb/in width	

View 

Test Method: ASTM D3167

Temp C: -55C

Temp F: -67F

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.

Bell Peel

77 lb/in width

View 

Test Method: ASTM D3167

Temp C: 23C

Temp F: 72F

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.

Bell Peel

39 lb/in width

View 

Test Method: ASTM D3167

Temp C: 82C

Temp F: 180F

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.

Overlap Shear Strength 7day Aluminum

2670 lb/in²

View 

Test Method: ASTM D1002

Test Name: Overlap Shear Strength

Dwell/Cure Time: 7.0

Dwell Time Units: day

Temp C: 23C

Temp F: 73F

Environmental Condition: 50%RH

Substrate: Aluminum

Surface Preparation: MEK/Abrade/MEK

Notes: 1in wide 1/2in overlap specimens. 2 panels of 0.05-0.064in x 4in x 7in 2024T-3 clad aluminum bonded and cut to 1in wide samples after 24hr. Jaw separation 0.1 in/min, 0.005-0.008in bondline. Cohesive (CF), Adhesive (AF), and Substrate (SF) Failure

Overlap Shear Strength 7day Cold Rolled Steel

3600 lb/in²

View 

Test Method: ASTM D1002

Test Name: Overlap Shear Strength

Dwell/Cure Time: 7.0

Dwell Time Units: day

Temp C: 23C

Temp F: 73F

Environmental Condition: 50%RH

Substrate: Cold Rolled Steel

Surface Preparation: MEK/Abrade/MEK

Notes: Overlap shear (OLS) strengths were measured on 1in wide 1/2in overlap specimens on 1in x 4in x .060in substrates. Jaw separation 0.1 in/min. 0.005-0.008in bondline. Cohesive (CF), Adhesive(AF), and Substrate(SF) Failure

Overlap Shear Strength 7day Copper

4400 lb/in²

View 

Test Method: ASTM D1002

Test Name: Overlap Shear Strength

Dwell/Cure Time: 7.0

Dwell Time Units: day

Temp C: 23C


Temp F: 73F


Environmental Condition: 50%RH


Substrate: Copper


Surface Preparation: MEK/Abrade/MEK


Notes: Overlap shear (OLS) strengths were measured on 1in wide 1/2in overlap specimens on 1in x 4in x 0.05-0.060in substrates. Jaw separation 0.1 in/min. 0.005-0.008in bondline. Cohesive (CF), Adhesive(AF), and Substrate(SF) Failure

Overlap Shear Strength 7day Brass	3400 lb/in ²	View 
<p>Test Method: ASTM D1002</p> <p>Test Name: Overlap Shear Strength Dwell/Cure Time: 7.0 Dwell Time Units: day Temp C: 23C Temp F: 73F Environmental Condition: 50%RH Substrate: Brass Surface Preparation: MEK/Abrade/MEK</p> <p>Notes: Overlap shear (OLS) strengths were measured on 1in wide 1/2in overlap specimens on 1in x 4in x 0.05-0.060in substrates. Jaw separation 0.1 in/min. 0.005-0.008in bondline. Cohesive (CF), Adhesive(AF), and Substrate(SF) Failure</p>		

Overlap Shear Strength 7day Stainless Steel	2400 lb/in ²	View 
<p>Test Method: ASTM D1002</p> <p>Test Name: Overlap Shear Strength Dwell/Cure Time: 7.0 Dwell Time Units: day Temp C: 23C Temp F: 73F Environmental Condition: 50%RH Substrate: Stainless Steel Surface Preparation: MEK/Abrade/MEK</p> <p>Notes: Overlap shear (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. These bonds were made individually using 1" x 4" x 0.060" substrate Jaw Separation 0.1in/min Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)</p>		

Overlap Shear Strength 7day ABS	345 lb/in ²	View 
<p>Test Method: ASTM D1002</p> <p>Test Name: Overlap Shear Strength Dwell/Cure Time: 7.0 Dwell Time Units: day Temp C: 23C Temp F: 73F Environmental Condition: 50%RH Substrate: ABS Surface Preparation: IPA Wipe</p> <p>Notes: Overlap shear (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. Bonds made with 1 in x 4 in x 0.125in pieces of substrate with a 0.005-0.008in bondline. Jaw Separation 2in/min Cohesive (CF), Adhesive (AF), Substrate (SF) Failure</p>		

Overlap Shear Strength 7day ABS	572 lb/in ²	View 
<p>Test Method: ASTM D1002</p> <p>Test Name: Overlap Shear Strength Dwell/Cure Time: 7.0 Dwell Time Units: day Temp C: 23C Temp F: 73F Environmental Condition: 50%RH Substrate: ABS Surface Preparation: IPA Wipe/Abrade/IPA Wipe</p> <p>Notes: Overlap shear (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. Bonds made with 1 in x 4 in x 0.125in pieces of substrate with a 0.005-0.008in bondline. Jaw Separation 2in/min Cohesive (CF), Adhesive (AF), Substrate (SF) Failure</p>		

Overlap Shear Strength 7day Polyvinyl chloride (PVC)	815 lb/in ²	View 
<p>Test Method: ASTM D1002</p>		

Test Name: Overlap Shear Strength
Dwell/Cure Time: 7.0
Dwell Time Units: day
Temp C: 23C
Temp F: 73F
Environmental Condition: 50%RH
Substrate: Polyvinyl chloride (PVC)
Surface Preparation: IPA Wipe
Failure Mode: SF

Notes: Overlap shear (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. 1" x 4" x 0.125" substrate Jaw separation 2 in/min; 0.005-0.008in bondline. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)

Overlap Shear Strength 7day Polyvinyl chloride (PVC)

313 lb/in²

View 

Test Method: ASTM D1002

Test Name: Overlap Shear Strength
Dwell/Cure Time: 7.0
Dwell Time Units: day
Temp C: 23C
Temp F: 73F
Environmental Condition: 50%RH
Substrate: Polyvinyl chloride (PVC)
Surface Preparation: IPA Wipe/Abrade/IPA Wipe
Failure Mode: SF

Notes: Overlap shear (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. 1" x 4" x 0.125" substrate Jaw separation 2 in/min; 0.005-0.008in bondline. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)

Overlap Shear Strength 7day Polycarbonate (PC)

380 lb/in²

View 

Test Method: ASTM D1002

Test Name: Overlap Shear Strength
Dwell/Cure Time: 7.0
Dwell Time Units: day
Temp C: 23C
Temp F: 73F
Environmental Condition: 50%RH
Substrate: Polycarbonate (PC)
Surface Preparation: IPA Wipe

Notes: Overlap shear (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. 1" x 4" x 0.125" substrate Jaw separation 2 in/min; 0.005-0.008in bondline. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)

Overlap Shear Strength 7day Polycarbonate (PC)

390 lb/in²

View 

Test Method: ASTM D1002

Test Name: Overlap Shear Strength
Dwell/Cure Time: 7.0
Dwell Time Units: day
Temp C: 23C
Temp F: 73F
Environmental Condition: 50%RH
Substrate: Polycarbonate (PC)
Surface Preparation: IPA Wipe/Abrade/IPA Wipe

Notes: Overlap shear (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. 1" x 4" x 0.125" substrate Jaw separation 2 in/min; 0.005-0.008in bondline. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)

Overlap Shear Strength 7day Acrylic (PMMA)






210 lb/in²

View 

Test Method: ASTM D1002

Test Name: Overlap Shear Strength
Dwell/Cure Time: 7.0
Dwell Time Units: day
Temp C: 23C
Temp F: 73F
Environmental Condition: 50%RH
Substrate: Acrylic (PMMA)
Surface Preparation: IPA Wipe

Notes: Overlap shear (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. 1" x 4" x 0.125" substrate Jaw separation 2 in/min; 0.005-0.008in bondline. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)

Overlap Shear Strength 7day Acrylic (PMMA)	270 lb/in ²	View 
<p>Test Method: ASTM D1002</p> <p>Test Name: Overlap Shear Strength Dwell/Cure Time: 7.0 Dwell Time Units: day Temp C: 23C Temp F: 73F Environmental Condition: 50%RH Substrate: Acrylic (PMMA)</p> <p>Notes: Overlap shear (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. 1" x 4" x 0.125" substrate Jaw separation 2 in/min; 0.005-0.008in bondline. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)</p>		
Overlap Shear Strength 7day Fiber-Reinforced Plastic	570 lb/in ²	View 
<p>Test Method: ASTM D1002</p> <p>Test Name: Overlap Shear Strength Dwell/Cure Time: 7.0 Dwell Time Units: day Temp C: 23C Temp F: 73F Environmental Condition: 50%RH Substrate: Fiber-Reinforced Plastic Surface Preparation: IPA Wipe</p> <p>Notes: Overlap shear (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. 1" x 4" x 0.125" substrate Jaw separation 2 in/min; 0.005-0.008in bondline. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)</p>		
Overlap Shear Strength 7day Fiber-Reinforced Plastic	1379 lb/in ²	View 
<p>Test Method: ASTM D1002</p> <p>Test Name: Overlap Shear Strength Dwell/Cure Time: 7.0 Dwell Time Units: day Temp C: 23C Temp F: 73F Environmental Condition: 50%RH Substrate: Fiber-Reinforced Plastic Surface Preparation: IPA Wipe/Abrade/IPA Wipe Failure Mode: SF</p> <p>Notes: Overlap shear (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. 1" x 4" x 0.125" substrate Jaw separation 2 in/min; 0.005-0.008in bondline. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)</p>		
T-Peel Adhesion -55C Aluminum	3 to 5 lb/in width	View 
<p>Test Method: ASTM D1876</p> <p>Test Name: T-Peel Adhesion Temp C: -55C Temp F: -67F Substrate: Aluminum</p> <p>Notes: T-peel strengths were measured on 1 in. wide bonds. The testing jaw separation rate was 20 inches per minute.</p>		
T-Peel Adhesion 23C Aluminum	60 lb/in width	View 
<p>Test Method: ASTM D1876</p> <p>Test Name: T-Peel Adhesion Temp C: 23C Temp F: 73F Substrate: Aluminum</p> <p>Notes: T-peel strengths were measured on 1 in. wide bonds. The testing jaw separation rate was 20 inches per minute.</p>		

T-Peel Adhesion 82C Aluminum

20 lb/in width


View 

Test Method: ASTM D1876

Test Name: T-Peel Adhesion
Temp C: 82C
Temp F: 180F
Substrate: Aluminum



Notes: T-peel strengths were measured on 1 in. wide bonds. The testing jaw separation rate was 20 inches per minute.

Electrical and Thermal Properties

Property	Values	Additional Information
Volume Resistivity	3.25 x 10 ¹⁵ Ω-cm	View 

Test Method: ASTM D257

Temp C: 23C
Temp F: 73F

Coefficient of Thermal Expansion	74.44 x 10 ⁻⁶ m/m/°C	View 
Test Condition: Below Tg		
Coefficient of Thermal Expansion	166 x 10 ⁻⁶ m/m/°C	View 

Test Condition: Above Tg

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.

Automotive Disclaimer

Automotive Applications: This product is an industrial product and has not been designed or tested for use in certain automotive applications, including, but not limited to, automotive electric powertrain battery or high voltage applications. This product does not fully adhere to typical automotive design or quality system requirements, such as IATF 16949 or VDA 6.3. This product may not be manufactured in an IATF certified facility and may not meet a Ppk of 1.33 for all properties. The product may not undergo an automotive production part approval process (PPAP). Customer is solely responsible for evaluating the product and determining whether it is appropriate and suitable for customer's automotive application and for conducting incoming inspections before use of the product. Failure to do so may result in injury, death, and/or harm to property. No written or verbal statement, report, data or recommendation by 3M related to automotive use of the product shall have any force or effect unless in an agreement signed by the Technical Director of 3M's Automotive Division. Customer assumes all responsibility and risk if customer chooses to use this product in an automotive electric powertrain battery or high voltage application, and 3M will not be liable for any loss or damage arising from or related to the 3M product or customer's use of the product, whether direct, indirect, special, incidental, or consequential (including, but not limited to, lost profits or business opportunity or recall costs), regardless of the legal or equitable theory asserted, including, but not limited to, warranty, contract, negligence, or strict liability. In no event shall 3M be liable for any damages in excess of the purchase price paid for the product.

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Bottom Matter

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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.

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.

References

Property	Values
3m.com Product Page	https://www.3m.com/3M/en_US/p/d/b40066459/
Safety Data Sheet SDS	https://www.3m.com/3M/en_US/company-us/SDS-search/results/?gsaAction=msdsSRA&msdsLocale=en_US&co=ptn&q=DP460NS

Family Group

Link Tags:

- DP460 Off White
- DP460NS

Products	Open Time (min)	Color	Time to Handling Strength	Time to Full Cure	Shore D Hardness
DP460 Off White	60 min	Off-White	4 hr	N/A	N/A
DP460NS	60 min	Off-White	N/A	24 hr	81

ISO Statement

This Industrial Adhesives and Tapes Division product was manufactured under a 3M quality system registered to ISO 9001 standards.

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