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English-US

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Technical Data Sheet

3M™ Scotch-Weld™ Epoxy Adhesive DP3501

Regulatory Info/SDS

Product Description

3M™ Scotch-Weld™ Epoxy Adhesive DP 3501 is a rapid room temperature curing, two-part epoxy adhesive for use in bonding many metals, wood, and a variety of plastics. Equal parts by volume are easily mixed to produce strong, impact-resistant bonds.

Product Features

- Two-part room temperature curing structural adhesive with high shear strength.
- Fast cure.
- Controlled flow/thixotropic.
- Good environmental resistance.
- Excellent for bonding metal, wood, most plastics and masonry products.

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 Weight (B:A)	1.1:1
Mix Ratio by Volume (B:A)	1:1

Attribute Name	Temperature	Value
Base Color		White
Accelerator Color		Black
Base Resin		Epoxy
Accelerator Resin		Amine
Base Net Weight		12.6 ± 0.2 lb/gal
Accelerator Net Weight		11.9 ± 0.2 lb/gal
Base Viscosity	23 °C (73 °F)	>1,000,000 cP [1]
Base Viscosity	23 °C (73 °F)	15 — 40 s [2]
Accelerator Viscosity	23 °C (73 °F)	>1,000,000 cP [1]
Accelerator Viscosity	23 °C (73 °F)	35 — 60 s [2]

[1] Brookfield RVF, #7 spindle, 2 RPM

[2] Seconds to deliver 20 g at 60 psi through 0.104" orifice

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
20 min	400 lb/in² [1]
30 min	500 lb/in² [2]

Dwell Time	Value
1 h	750 lb/in² [2]
90 min	900 lb/in² [3]

[1] 25 mm wide 12.7 mm (1 in, 0.5 in) overlap shear specimens. 2 panels 1.6 mm (0.063 in) thick, 100 x 180 mm (4 x 7 in) of 2024T-3 clad aluminum bonded and cut 25 mm (1 in) wide samples after 24hr. 0.18 mm (7mil) bondline. Jaw Separation 2.5 mm/min (0.1 in/min)

[2] 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

[3] Specimens: 1/2-inch overlap prepared from 1 x 4-inch x 2024 T-3 clad FPL etched aluminum. Specimens were pulled at 2 inches/min.

Attribute Name	Temperature	Value
Open Time		7 min [1]
Time to Full Cure	23 °C (73 °F)	0.25 h [2]
Worklife, 20g mixed	23 °C (73 °F)	6 — 10 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.

[2] 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.

Typical Physical Properties

Attribute Name	Value
Cured Color	Gray

Typical Cured Characteristics

Temperature: 23 °C (73 °F)

Attribute Name	Test Method	Value
Shore D Hardness	ASTM D2240	77

Typical Performance Characteristics

Substrate: Cold Rolled Steel
Surface Prep: MEK/Abrade/MEK
Temperature: 23 °C (73 °F)
Dwell Time: 7 d

Attribute Name	Test Method	Value
Overlap Shear Strength	ASTM D1002, ISO 4587	2,000 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

Temperature: 23 °C (73 °F)
Test Method: ASTM D1876

Substrate	Surface Prep	Value
Aluminum		4 lb/in width [1]
Cold Rolled Steel	MEK/Abrade/MEK	10 lb/in width [2]

[1] T-Peel bonds were measured on 25 mm (1 in) wide specimens cut from two FPL etched 203 x 203 x 0.8 mm (8 x 8 x 0.032 in), 2024 T3 clad aluminum panels bonded together. The separation note of the testing jaws was 508 mm/min (20 in/min).

[2] T-Peel bonds were measured on two 1" wide specimens of 0.035" cold rolled steel bonded together. The separation rate of the testing jaws was 20"/minutes..

Electrical and Thermal Properties

Attribute Name	Test Condition	Value
Coefficient of Thermal Expansion	-50 ~ 10 °C	60 x 10^{-6} m/m/°C
Coefficient of Thermal Expansion	50 ~ 110 °C	234 x 10^{-6} m/m/°C
Thermal Conductivity		0.193 (btu-ft)/(h-ft^2-°F)

Temperature: 23 °C (73 °F)

Attribute Name	Test Method	Value
Volume Resistivity	ASTM D257	1.2 x 10^{13} Ω-cm

Handling/Application Information

Directions for Use

3M™ Scotch-Weld™ Epoxy Adhesive DP 3501 is supplied in dual syringe plastic duo-pak cartridges as part of the 3M™ EPX™ Applicator System. The duo-pak cartridges are supplied in 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, join parts and secure until adhesive sets (see rate of strength build up).
These products may be applied by spatula, trowel, or flow equipment.

Surface Preparation

For high strength structural bonds, paint, oxide films, oils, dust, mold release agents and all other surface contaminants must be removed. The amount of surface preparation depends on the user's required bond strength and environmental aging resistance.
The following cleaning methods are suggested for these common surfaces:
Steel:
1. Wipe free of dust with oil-free solvent such as Methyl Ethyl Ketone (MEK).*
2. Sandblast or abrade using clean fine grit abrasives.
3. Wipe again with solvent to remove loose particles.
Aluminum:
1. Vapor Degrease – Perchloroethylene* condensing vapors for 5-10 minutes.
2. 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.
3. Acid Etch: Place panels in the following solution for 10 minutes at 150°F ± 5°F (66°C ± 2°C).
Sodium Dichromate 4.1-4.9 oz./gallon
Sulfuric Acid, 66°Be 38.5-41.5 oz./gallon 2024-T3 aluminum (dissolved) 0.2 oz./gallon minimum Tap Water Balance of Volume
Note: Read and follow component supplier's environmental, health and safety recommendations prior to preparation of this etch solution.
4. Rinse – Rinse panels in clear running tap water.
5. Dry – Air dry 15 minutes; force dry 10 minutes at 150°F ± 5°F (66°C ± 2°C).
6. If primer is to be used, it should be applied within 4 hours after surface preparation.
7. Read manufacturer's hazard communication and follow manufacturer's recommended guidelines for safe handling of the above chemical products.
Plastics:
1. Solvent wipe with Isopropyl Alcohol.*
2. Abrade using clean fine grit abrasives.
3. Solvent wipe with Isopropyl Alcohol.*
Rubbers:
1. Solvent wipe with Methyl Ethyl Ketone (MEK).*
2. Abrade using clean fine grit abrasives.
3. Solvent wipe with MEK.*
***Note:**When using solvents, extinguish all ignition sources and follow manufacturer's precautions and directions for use.

Storage and Shelf Life

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

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

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ISO Statement

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

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