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English-US

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Technical Data Sheet

3M™ Scotch-Weld™ Epoxy Adhesive 2216 B/A Gray

Product Details

Regulatory Info/SDS

Product Description

3M™ Scotch-Weld™ Epoxy Adhesive 2216 B/A is a flexible, two-part, room temperature curing epoxy with high peel and shear strength, available in three versions. 2216 B/A Gray meets DOD-A-82720.

Product Features

- Excellent for bonding many metals, woods, plastics, rubbers, and masonry products.
- Base and Accelerator are contrasting colors.
- Good retention of strength after environmental aging.
- Resistant to extreme shock, vibration, and flexing.
- Excellent for cryogenic bonding applications.
- Excellent for potting parts subject to thermal cycling.
- The tan NS Adhesive is non-sag for greater bond-line control.
- The translucent can be injected.
- Meets DOD-A-82720.

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)	2:3
Mix Ratio by Weight (B:A)	5:7

Attribute Name	Temperature	Value
Base Color		White
Accelerator Color		Gray
Base Resin		Modified Epoxy
Accelerator Resin		Modified Amine
Base Net Weight		11.1 — 11.6 lb/gal
Accelerator Net Weight		10.5 — 11.0 lb/gal
Base Viscosity	22 °C (72 °F)	75,000-150,000 cP [1]
Accelerator Viscosity	22 °C (72 °F)	40,000-80,000 cP [1]

[1] Brookfield RVF #7 spindle at 20 rpm.

Typical Mixed Physical Properties

Attribute Name	Temperature	Value
Open Time		90 min [1]
Time to Full Cure	66 °C (150 °F)	120 min
Time to Full Cure	93 °C (200 °F)	30 min
Worklife, 100g mixed	22 °C (72 °F)	90 min
Time to Handling Strength	22 °C (72 °F)	8 — 12 h
Time to Full Cure	22 °C (72 °F)	7 d

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

Typical Physical Properties

Attribute Name	Value
Cured Color	Gray

Typical Cured Characteristics

Shear Modulus

Substrate: Etched Aluminum
Temperature: 66 °C (150 °F)
Dwell Time: 2 h
Test Method: ASTM D1002, ISO 4587
Environmental Condition: +2 psi

Test Condition	Value
-100°C (-148°F)	2745 MPa (398000 lb/in²)
-60°C (-76°F)	2199 MPa (318855 lb/in²)
-40°C (-40°F)	1947 MPa (282315 lb/in²)
22°C (72°F)	342 MPa (49580 lb/in²)
0°C (32°F)	1500 MPa (218805 lb/in²)

Temperature: 22 °C (72 °F)

Attribute Name	Test Method	Value
Shore D Hardness	ASTM D2240	57

Outgassing Data

Temperature: 22 °C (72 °F)
Dwell Time: 7 d
Test Method: NASA 1124 Revision 4

Test Condition	Value
% CVCM	0.04
% TML	0.77
% Wtr	0.23

Typical Performance Characteristics

Temperature: 22 °C (72 °F)

Attribute Name	Test Method	Value
T-Peel Adhesion	ASTM D1876	25 lb/in

Electrical and Thermal Properties

Attribute Name	Test Condition	Value
Coefficient of Thermal Expansion	40°C ~ 80°C	134 x 10^{-6} m/m/°C
Thermal Conductivity		0.228 (btu-ft)/(h-ft²-°F)

Attribute Name	Test Method	Temperature	Test Condition	Value
Dielectric Constant	ASTM D150	22 °C (72 °F)	1 KHz	5.51
Dissipation Factor	ASTM D150	22 °C (72 °F)	1 KHz	0.112

Attribute Name	Test Method	Temperature	Test Condition	Value
Surface Resistivity	ASTM D257		@ 500 volts DC, Room Temperature	5.5 x 10^{16} Ω
Volume Resistivity	ASTM D257	22 °C (72 °F)		1.9 x 10^{12} Ω-cm
Arc Resistance	ASTM D495			130 s

Handling/Application Information

Directions for Use

1. For high strength structural bonds, paint, oxide films, oils, dust, mold release agents and all other surface contaminants must be completely removed. However, the amount of surface preparation directly depends on the required bond strength and the environmental aging resistance desired by user. For suggested surface preparations of common substrates, see the following section on surface preparation.
2. These products consist of two parts. Mix thoroughly by weight or volume in the proportions specified on the product label and in the uncured properties section. Mix approximately 15 seconds after a uniform color is obtained.
3. For maximum bond strength, apply product evenly to both surfaces to be joined.
4. Application to the substrates should be made within 90 minutes. Larger quantities and/or higher temperatures will reduce this working time.
5. Join the adhesive coated surfaces and allow to cure at 60°F (16°C) or above until firm. Heat, up to 200°F (93°C), will speed curing.
6. Keep parts from moving until handling strength is reached. Contact pressure is necessary. Maximum shear strength is obtained with a 3-5 mil bond line. Maximum peel strength is obtained with a 17-25 mil bond line.
7. Excess uncured adhesive can be cleaned up with ketone type solvents.* Adhesive Coverage: A 0.005 in thick bondline will typically yield a coverage of 320 sq. ft/gallon
*When using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer's precautions and directions for use. Use solvents in accordance with local regulations.

Surface Preparation

For high strength structural bonds, paint, oxide films, oils, dust, mold release agents and all other surface contaminants must be completely removed. However, the amount of surface preparation directly depends on the required bond strength and the environmental aging resistance desired by user.
The following cleaning methods are suggested for common surfaces.
Steel or Aluminum (Mechanical Abrasion)
1. Wipe free of dust with oil-free solvent such as acetone or alcohol solvents.
2. Sandblast or abrade using clean fine grit abrasives (180 grit or finer).
3. Wipe again with solvents to remove loose particles.
4. If a primer is used, it should be applied within 4 hours after surface preparation.
Aluminum (Chemical Etch)
Aluminum alloys may be chemically cleaned and etched as per ASTM D 2651. This procedure states to:
1. Alkaline Degrease – Oakite 164 solution (9-11 oz/gal of water) at 190°F ± 10°F (88°C ± 5°C) for 10-20 minutes. Rinse immediately in large quantities of cold running water.
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 etch aluminum panels, place them in FPL etch solution heated to 66 to 71°C (150 to 160°F). Panels should soak for 12 to 15 minutes.
3. Rinse: Rinse panels in clear running tap water.
4. Dry: Air dry 15 minutes; force dry 10 minutes (minimum) at 140°F (60°C) maximum.
5. If primer is to be used, it should be applied within 4 hours after surface preparation.
Plastics/Rubber
1. Wipe with isopropyl alcohol.
2. Abrade using fine grit abrasives (180 grit or finer).
3. Wipe with isopropyl alcohol.
Glass
1. Solvent wipe surface using acetone or MEK.
2. Apply a thin coating (0.0001 in. or less) of 3M™ Scotch-Weld™ Structural Adhesive Primer EC-3901 to the glass surfaces to be bonded and allow the primer to dry a minimum of 30 minutes @ 75°F (24°C) before bonding.

Note: When using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer's precautions and directions for use. Use solvents in accordance with local regulations.

Application Techniques

These products may be applied by spatula, trowel or flow equipment. Two-part mixing/proportioning/dispensing equipment is available for intermittent or production line use. These systems are ideal because of their variable shot size and flow rate characteristics and are adaptable to many applications.

Industry Specifications

UL 94 HB
DOD-A-82720

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.

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.

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ISO Statement

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

3M™ Industrial Adhesives and Tapes Division
3M Center, St. Paul, MN 55144-1000
3M.com/iatd

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