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February, 2018

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

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.

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

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

Property	Values	Test Condition	Notes
Base Color	White		
Accelerator Color	Gray		
Base Viscosity	75,000-150,000 cP	Room Temperature	Brookfield RVF #7 spindle at 20 rpm.
Accelerator Viscosity	40,000-80,000 cP	Room Temperature	Brookfield RVF #7 spindle at 20 rpm.
Base Resin	Modified Epoxy		
Accelerator Resin	Modified Amine		
Base Net Weight	11.1 to 11.6 lb/gal		
Accelerator Net Weight	10.5 to 11.0 lb/gal		
Mix Ratio by Volume (B:A)	2:3		
Mix Ratio by Weight (B:A)	5:7		

Typical Mixed Physical Properties

Property	Values	Test Condition
Worklife, 100g mixed	90 min	Room Temperature
Time to Handling Strength	8 to 12 h	Room Temperature

Time to Full Cure	Test Condition
7 day	Room Temperature
120 min	@ 150°F(66°C)
30 min	@ 200°F(93°C)

Property: Time to Full Cure

Typical Physical Properties

Color: Gray

Conditions
Attribute Modifier: Cured

Typical Cured Characteristics

Shore D Hardness: 57

Conditions
Dwell/Cure Time: 60 min @ Room Temperature
Methods
ASTM D2240

Outgassing Data	Test Condition
0.77	% TML
0.04	% CVCM
0.23	% Wtr

Property: Outgassing Data
Method: NASA 1124 Revision 4
Dwell/Cure Time: Cured in air for 7 days @ Room Temperature

Shear Modulus		Test Condition
2745 MPa	398000 lb/in²	@ -148°F(-100°C)
2199 MPa	318855 lb/in²	@ -76°F(-60°C)
1947 MPa	282315 lb/in²	@ -40°F(-40°C)
1500 MPa	218805 lb/in²	@ 32°F(0°C)
342 MPa	49580 lb/in²	Room Temperature

Property: Shear Modulus
Method: ASTM D1002
Dwell/Cure Time: 2 hr @ 150 ± 5°F(66°C ± 2°C), 2 psi pressure
Substrate: Etched Aluminum

Electrical and Thermal Properties

Property	Values	Method	Test Condition
Dielectric Constant	5.51	ASTM D150	1 KHz, Room Temperature
Dissipation Factor	0.112	ASTM D150	1 KHz, Room Temperature
Thermal Conductivity	0.228 (btu-ft)/(h-ft²-°F)		
Volume Resistivity	1.9 × 10^12 Ω-cm	ASTM D257	Room Temperature
Surface Resistivity	5.5 × 10^16 Ω	ASTM D257	@ 500 volts DC, Room Temperature
Coeficient of Thermal Expansion	102 × 10^-6 m/m/°C		between 0-40°C
Coeficient of Thermal Expansion	134 × 10^-6 m/m/°C		between 40-80°C
Arc Resistance	130 s	ASTM D495	

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Typical Performance Characteristics

T-Peel Adhesion: 25 lb/in width

Conditions
Temp C: 23C
Temp F: 73F
Methods
ASTM D1876

Handling/Application Information

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.

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.

Handling/Application Information (continued)

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.

Storage and Shelf Life

Store products at 60-80°F (16-27°C) for maximum storage life.
When stored at the recommended temperatures in the original, unopened containers, the shelf life is 24 months from date of manufacture from 3M.

Industry Specifications

UL 94 HB
DOD-A-82720

Trademarks

References

Property	Values
3m.com Product Page	https://www.3m.com/3M/en_US/company-us/all-3m-products/~/3M-Scotch-Weld-Epoxy-Adhesive-2216?N=5002385+3293241721&rt=rud
Safety Data Sheet (SDS)	https://www.3m.com/3M/en_US/company-us/SDS-search/results/?gsaAction=msdsSRA&msdsLocale=en_US&co=ptn&q=2216 B/A Gray

Family Group

	2216 B/A Gray	2216 B/A Tan NS	2216 B/A Translucent
Time to Handling Strength (h) Test Condition: Room Temperature	8 to 12	8 to 12	12 to 16
Color Attribute Modifier: Cured	Gray	Tan	Translucent

ISO Statement

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

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 or (651) 737-6501.

Information

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