3M

Scotch-Weld™

Urethane Adhesives

3532 B/A • 3535 B/A • 3549 B/A

Technical Data **May, 1995**

(Supersedes April 1, 1991)

Product Description

- 3M™ Scotch-Weld™ 3532 B/A, 3535 B/A and 3549 B/A Urethane Adhesives are two-component, polyurethane adhesives which cure at room temperature or with heat to form tough, impact-resistant structural bonds. Their adhesion properties are identical and they vary only in work life, cure time and color. They provide excellent adhesion to many primed or painted metal and plastic substrates and are designed to develop sag resistance approximately 30 seconds after mixing.
- 3M™ EC-1945 B/A Primer is suggested for use on metal surfaces to achieve maximum resistance to water, humidity and salt spray. For best results it is also suggested that the primer itself or primer/adhesive system be heat cured (see Primer Information in Directions for Use section on page 2).

Typical Physical Properties

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

3532 B/A Adhesive	**Base**	**Accelerator**
Color (Cured: Brown)	Off-White	Brown
Base	Polyol	Isocyanate
Net Weight (lbs./gal.)	10.3	11.2
Viscosity cps @ 75°F (24°C)	Brookfield RVF #6 sp. @ 20 rpm: 10,000-55,000 cps	Brookfield RVF #5 sp. @ 10 rpm: 15,000-40,000 cps
Mix Ratio: By Weight By Volume	100 100	109 100
Work Life: 100 grams mixed at 75°F (24°C): 5-15 min. **Time to Reach Full Cure @ 75°F (24°C)** 24 hours		

3535 B/A Adhesive	**Base**	**Accelerator**
Color (Cured: Off-White)	White	Brown
Base	Polyol	Isocyanate
Net Weight (lbs./gal.)	10.9	11.3
Viscosity cps @ 75°F (24°C)	Brookfield RVF #6 sp. @ 10 rpm: 5,000-40,000 cps	Brookfield RVF #5 sp. @ 10 rpm: 15,000-40,000 cps
Mix Ratio: By Weight By Volume	100 100	104 100
Work Life: 100 grams mixed at 75°F (24°C): 45 sec.-240 sec.		

Typical Physical Properties *(continued)*

3549 B/A Adhesive	Base	Accelerator
Color (Cured: Brown)	Off-White	Brown
Base	Polyol	Isocyanate
Net Weight (lbs./gal.)	10.3	11.2
Viscosity cps @ 75°F (24°C)	Brookfield RVF #6 sp. @ 10 rpm: 10,000-40,000 cps	Brookfield RVF #5 sp. @ 10 rpm: 15,000-40,000 cps
Mix Ratio: By Weight By Volume	100 100	109 100
Work Life: 100 grams mixed at 75°F (24°C): 40-70 min. **Time to Reach Full Cure @ 75°F (24°C)** 7 days		

Application and Equipment Suggestions

These products may be applied with spatula, trowel, or flow equipment. Appropriate two-part metering and mixing equipment is also commercially available.

Directions for Use

1. Surfaces to be bonded must be dry and free from rust, oil, grease and wax. Surfaces can be cleaned with an abrasive such as 3M™ Coated Abrasives (240 grit) followed by wiping with a solvent such as Scotch-Grip™ Solvent No. 3.*
2. **Primer Information:**

   3M EC-1945 B/A Primer is an amine-cured epoxy in blended ketone solvent. It has a 1-to-1 mix ratio by volume. Primer may be applied by spray, roller or brush. One coat is suggested, thickness 0.3 to 0.7 mils when dry.

   The primer must contain no solvent prior to application of adhesive. Drying time is dependent on various factors, including ambient temperature, air movement and relative humidity. Forced drying will provide uniform performance of the primer. Suggested dry times are approximately 10 min. at room temperature followed by 30 min. at 180°F (82°C) or a minimum of one hour at room temperature. Shorter dry times are possible at higher temperatures. The user should determine what is appropriate for the user's application. Mix parts A and B at least one hour before spray application. Pot life is eight hours after mixing parts A and B. Primed surface should be kept free of contamination prior to application of adhesive.

   ***Note:** When using solvents, extinguish all ignition sources and follow the manufacturer's precautions and directions for use when handling such materials.

Typical Performance Characteristics

Overlap Shear Strength-Metals: The following are typical data after a full cure showing the adhesion of 3532 B/A, 3535 B/A and 3549 B/A adhesives to various metal substrates. All aluminum data were developed on .063-inch thick 2024 T-3 clad aluminum and all steel data on .035-inch cold rolled steel. Test specimens were 1/2-inch overlap, 1-inch wide with .005-inch thick bondlines pulled at a testing rate of .1-inch/min. All values are psi.

Substrate	Test Temperature		
	-40°F (-40°C)	75°F (24°C)	180°F (82°C)
Etched Aluminum	2500	2000	300
Abraded and Solvent Wiped Aluminum	2000	2000	300
Solvent Wiped Aluminum	1000	1000	100
Abraded and Solvent Wiped Steel	2000	1200	100
Solvent Wiped Steel	1000	700	20
Abraded and Solvent	600[1]	1000	100
Wiped Steel Primed with 3M Brand EC-1945 B/A Primer	800[2]	2000	300
Abraded and Solvent	1800[1]	1500	150
Wiped Aluminum Primed with 3M Brand EC-1945 B/A Primer	2100[2]	2300	200

[1]Room temperature cure of primer and adhesive.
[2]30 min. @ 180°F (82°C) cure of primer and adhesive.

Overlap Shear Strength-Plastics: The following are typical data after a full cure showing the adhesion of 3532 B/A, 3535 B/A and 3549 B/A adhesives to various plastic substrates. All data were developed on 1/8-inch thick, 1/2-inch overlap, 1-inch wide specimens with .005-inch thick bondlines that had been abraded and alcohol wiped prior to bonding. Values are in psi.

Substrate	Test Temperature		
	-40°F (-40°C)	75°F (24°C)	180°F (82°C)
Nylon	240	580	40
Lexan™	1240[3]	1840[3]	125
Plexiglass™	620	1300	70
FRP	1660[3]	1150[3]	180
Rigid PVC	370	960	110
ABS	440[3]	810	300
Polystyrene	330	530	110

[3]Denotes substrate failure.

Tensile and Elongation: Scotch-Weld 3532 B/A, 3535 B/A and 3549 B/A Urethane Adhesives have been tested according to ASTM-D-738 at 2 inches/min. Cure: 1 hour at 250°F (121°C), 30 min. at 285°F (141°C).

Temperature	Tensile	Elongation
Room Temperature	3000 psi	96%

Rate of Strength Buildup: The following are typical test data showing the rate of strength buildup at various temperatures and times.

Typical Performance Characteristics ***(continued)***

3532 B/A Adhesive at room temperature
Specimens: 1/2-inch overlap fiber reinforced plastic to primed steel, 0.032-inch bondline. Specimens were pulled at 2 inches/min.

Time (Hours)	Overlap Shear Strength (PSI)
0.5	5
1	20
2	90
3	400
4	490
5	560
6	680
7	790
16	1200
24	1550

3532 B/A Adhesive at various temperatures
Specimens: 1/2-inch overlap shear, fiber reinforced plastic to primed steel .032-inch bondline. Specimens were placed in an oven at designated temperature for the specified time. Bonds were then cooled for 1 minute and pulled at a rate of 2-inch/min.

Temperature	Time (Minutes)	Overlap Shear Strength (PSI)
100°F (38°C)	10	0
	30	240
	45	500
	60	650
120°F (49°C)	10	140
	20	480
	30	750
150°F (66°C)	5	120
	10	400
	15	760
180°F (82°C)	5	400
	10	660
	15	900
200°F (93°C)	2	340
	5	660
	10	900
225°F (107°C)	2	440
	5	760
	10	900

3535 B/A Adhesive at 73°F (23°C)
Specimens: 1/2-inch overlap prepared from 1 x 4-inch x 2024 T-3 clad FPL etched aluminum, .005-inch bondline. Specimens were pulled at 2 inches/min.

Time (Minutes)	Overlap Shear Strength (PSI)
5	0
15	16
30	227
45	689
60	858
75	1202
90	1507
105	1640
120	1460
180	1877

Typical Performance Characteristics ***(continued)***

3535 B/A Adhesive at 150°F (66°C)
Specimens: 1/2-inch overlap prepared from 1 x 4-inch x 2024 T-3 clad FPL etched aluminum, .005-inch bondline. Specimens were placed in 150°F (66°C) oven and cured for specified time. Time to reach 150°F (66°C) was 4 min. Specimens were then removed and tested at 2-in./min. During testing the specimens were a approximately 125°F (49°C).

Time (Minutes)	Overlap Shear Strength (PSI)
5	844
10	1055
15	1175
20	1165
30	1305
45	1490
60	1455

3549 B/A Adhesive at room temperature
Specimens: 1/2-inch overlap fiber reinforced plastic to primed steel, 0.32-inch bondline. Specimens were pulled at 2 inches/min.

Time (Hours)	Overlap Shear Strength (PSI)
4	2
6	11
8	80
16	460
24	700
48	1170

3549 B/A Adhesive at various temperatures
Specimens: 1/2-inch overlap fiber reinforced plastic to primed steel, .032-inch bondline. Specimens were placed in an oven at designated temperature for the specified time. Bonds were then cooled for 1 min. and pulled at a rate of 2 inches/min.

Temperature	Time (Minutes)	Overlap Shear Strength (PSI)
150°F (66°C)	20	53
	30	227
	40	259
	50	508
180°F (82°C)	20	293
	30	391
	40	576
	50	684
200°F (93°C)	10	177
	20	409
	30	614
	40	683
225°F (107°C)	10	392
	20	730

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Storage and Shelf Life

Storage: Store product at 60-80°F (16-27°C) for maximum storage life. Higher temperatures reduce normal storage life. Lower temperatures cause increased viscosity of a temporary nature. Rotate stock on a "first in-first out" basis.

Shelf Life: These products have a shelf life of 1 year from date of shipment when properly stored in their unopened containers.

Precautionary Information

Refer to Product Label and Material Safety Data Sheet for Health and Safety Information before using the product.

For Additional Information

To request additional product information or to arrange for sales assistance, call toll free 1-800-742-5933. Address correspondence to: 3M Industrial Tape and Specialties Division, 3M Center, Building 220-8E-04, P.O. Box 33220, St. Paul, MN 55133-3220. Our fax number is 612-736-4776. In Canada, phone: 1-519-451-2500. In Puerto Rico, phone: 1-809-750-3000. In Mexico, phone: 1-915-6-26-04-00.

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ISO 9002

This Industrial Tape and Specialties Division product was manufactured under a 3M quality system registered to ISO 9002 standards.

For Additional Product Safety and Health Information, See Material Safety Data Sheet, or call:

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