

3M

Scotch-Weld™

Epoxy Adhesive

EC-1469

Technical Data

November, 2010

Product Description 3M™ Scotch-Weld™ Epoxy Adhesive EC-1469 is a one-part, 100% solids, thermosetting liquid adhesive.

- Advantages**
- Exceptionally high strength at service temperatures from -70°F to 300°F (-57°C to 149°C).
 - No volatile by-products are given off during cure. This unique property makes Scotch-Weld EC-1469 particularly useful for bonding impervious surfaces and enables curing under minimal pressure. Only pressures sufficient to insure contact between mating surfaces are required.
 - Easy application by knife coating, trowel, roller coating, pump and high pressure injection methods.
 - Excellent retention of strength after aging in typical environments.

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.

Base:	Modified Epoxy Resin
Solvent:	None
Color:	White to Cream
Net Weight:	10.0 ± 0.2 lbs./gallon
Flash Point:	220°F (104°C) (CC)
Flow Initiation Temperature:	60°F (16°C)
Consistency:	Flowable Syrup
Viscosity:	40,000-80,000 cps
Cure Initiation Temperature:	280-300°F (138-149°C)

Application Characteristics

3M™ Scotch-Weld™ Epoxy Adhesive EC-1469 can be applied by a spatula, knife coating, notched trowel, or by extruding into place. Standard equipment is available which allows pumping directly from five-gallon pails. When extruded through a Pyles-Semco cartridge (3/32" orifice 55 psi line pressure), the delivery rate at 72°F (22°C) is approximately 40 grams/ minute. A lower viscosity for ease of application can be obtained by warming Scotch-Weld EC-1469 to 100-120°F (38-49°C). **Note:** Scotch-Weld EC-1469 may start to thicken if held at 120°F (49°C) for more than 3 hours.

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Equipment Suggestions **Pump** – 9 to 1 ratio minimum, double acting, divorced design, ball type check valve, 11 cubic inch/cycle, with 4¹/₄" air motor.

Primer – Disc type inductor plate.

Caution: Care should be taken not to incorporate air into the adhesive during application. Entrapped air can expand during cure to give a porous and weakened bond.

Directions for Use **Surface Preparation:** A thoroughly cleaned, dry, grease free surface is essential for optimum performance. Cleaning methods which will produce a breakfree water film on metal surfaces are generally satisfactory. Surface preparations should be fully evaluated with the adhesive, especially if the need for resistance to specific environments is anticipated.

Recommended Cleaning Procedure for Aluminum:

- 1. Vapor Degrease** – Perchloroethylene condensing vapors for 5-10 minutes.
- 2. Alkaline Degrease** – Oakite 164 solution (9-11 oz./gallon of water) at 190 ± 10°F (88 ± 5°C) for 10-20 minutes. Rinse immediately in large quantities of cold running water.
- 3. Acid Etch*** – Place panels in either of the following solutions for 10 minutes at 150 ± 5°F (67 ± 2°C).

	<u>A (FPL Etch*)</u>	<u>B</u>
Distilled Water	30 parts	30 parts
Sulfuric Acid (con.)	10 parts	10 parts
Sodium Dichromate	1 part	4 parts

- 4. Rinse** – Rinse panels in clear running water.
- 5. Dry** – Air dry, 15 minutes. Force dry, 10 minutes at 150 ± 10°F (67 ± 5°C).
- 6.** It is advisable to coat the freshly cleaned surfaces with adhesive within 4 hours after surface preparation.

*When using etch solutions, proper protective equipment for eyes, skin and respiratory system should be used.

Adhesive Layup:

Care should be taken to avoid contaminating adhesive and cleaned aluminum. Contamination could hinder wetting action of the adhesive and cause inferior bonds.

Bond Line Thickness:

Optimum performance is obtained with a 2-5 mil cured bond line thickness.

Cleanup:

Excess adhesive and equipment may be cleaned up, prior to curing, with ketone* type solvent.

***Note:** When using solvents, extinguish all ignition sources, including pilot lights, and follow manufacturer's precautions and directions for use.

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Cure Conditions

Flow and Cure Initiation Temperatures:

Normal flow and cure initiation temperatures for 3M™ Scotch-Weld™ Epoxy Adhesive EC-1469 are as follows:

Flow Temperature:	60°F (16°C)
Cure Initiation Temperature:	280-300°F (138-149°C)

Cure Pressure: The only pressure needed during the cure of Scotch-Weld EC-1469 is that required to keep parts in alignment and to overcome distortion and thermal expansion in the adherends.

Cure Temperature: The cure temperature may be varied from 300°F to 450°F (149°C to 232°C), depending on the materials being bonded, equipment available and bond properties desired. Scotch-Weld EC-1469 will wet the surface to which it has been applied. Heating at temperatures above 300°F (149°C) will chemically convert the adhesive into a high strength solvent-resistant bond. Cure temperatures in excess of 400°F (204°C) yield useful, but lower than optimum strengths. At these temperatures the time cycle must be determined for specific application. Bond line temperature rise rates from 2°F to 200°F (-17°C to 93°C) per minute can be used without affecting strength properties. **Curing ovens must be vented to the outdoors.**

Caution: Large volumes of Scotch-Weld EC-1469, if heated rapidly at temperatures above 300°F (149°C), will exotherm and char. This will generally occur if an adhesive thickness of greater than 1/8" thick is cured.

Cure Time: Cure time depends on the cure temperature used, methods of heat application, production limitations and bond properties required. Since no two bonding operations are exactly alike, it is suggested that a few simple experiments be conducted, varying both temperature and cure time to determine optimum conditions for the particular application.

Suggested Cure Cycle

The following cure cycle is suggested to obtain dense bond lines and was used to obtain the strengths reported in the product performance section:

1. Apply a pressure of 25 psi prior to reaching a bond line temperature of 150°F (67°C) and maintain throughout the cycle. (Pressure was used to insure flat test panels.)
2. Raise the bond line temperature from ambient to 350°F (177°C). Bonds were placed in a hot press @ 350°F (177°C) and cooled to below 200°F (93°C) prior to removal.
3. Cure for 120 ± 1 minutes at 350 ± 2°F (177 ± 1°C).
4. Cool to below 200°F (93°C) bond line temperature prior to release of pressure. (In laboratory tests, panels have been removed at 350°F (177°C) with no adverse effects.)

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Performance Characteristics

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

Test Condition	Test Result (Average)
A. Tensile Shear 1. Normal Temperature (75°F [24°C]) 2. 10 minutes @ 300°F (149°C) 3. 300°F (149°C) after 192 hours @ 300°F (149°C) 4. 10 minutes @ -67°F (-55°C) 5. Normal Temperature (75°F [24°C]) After 30 Days Salt Water Spray 6. Normal Temperature (75°F [24°C]) After 30 Days @ 120°F (49°C) & 95-100% Relative Humidity 7. Normal Temperature (75°F [24°C]) After 30 Days Immersion in Tap Water 8. Normal Temperature (75°F [24°C]) After 7 Days Immersion in JP-4 Fuel 9. Normal Temperature (75°F [24°C]) After 7 Days Immersion in Anti-icing Fluid 10. Normal Temperature (75°F [24°C]) After 7 Days Immersion in Hydraulic Oil 11. Normal Temperature (75°F [24°C]) After 7 Days Immersion in Type III Hydrocarbon Fluid	3695 psi 3633 psi 2260 psi 3150 psi 3081 psi 3025 psi 3603 psi 2766 psi 2766 psi 2659 psi 2651 psi
B. Creep Rupture 12. Normal Temperature [75°F (24°C)] 192 hours @ 1600 psi 13. 300°F (149°C) 192 hours @ 800 psi	.0000" .0000"
C. Fatigue 14. Normal Temperature [75°F (24°C)] 750 psi @ 10 ⁶ Cycles	No failure

Storage

Store 3M™ Scotch-Weld™ Epoxy Adhesive EC-1469 at 40°F (4°C) or lower for optimum storage life. The product should be permitted to thoroughly warm to room temperature before opening in order to prevent moisture condensation on the adhesive surface. Rotate stock on a “first in - first out” basis.

Handling

Scotch-Weld EC-1469 has a shelf life of 15 months from the date of shipment from 3M when stored in its original unopened container at 40°F (4°C) or below. Shelf life is 24 months if stored at 0°F (-18°C) or below.

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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.

Technical Information

The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

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