

3M

Scotch-Weld™

Epoxy Adhesive

EC-3333 B/A

Technical Data

May 2010

Introduction

3M™ Scotch-Weld™ Epoxy Adhesive EC-3333 B/A is a two-component epoxy adhesive which cures at room temperature or with heat to form a tough, impact-resistant bond. It has excellent adhesion to many metal and plastic substrates.

Advantages

- Extremely high shear strength
- Extremely high peel strength
- Outstanding environmental resistance
- Easy mixing
- Controlled flow
- 20 minute worklife

Product Description

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

	Scotch-Weld EC-3333 Adhesive Part B	Scotch-Weld EC-3333 Adhesive Part A
Component:	Base	Accelerator
Viscosity (Brookfield RVF):	40,000 - 100,000 cps	8,000 - 14,000 cps
Color:	Dark Gray	Amber
Weight/Gallon:	9.3 - 9.7 lbs.	9.1 - 9.5 lbs.
Solids:	100%	100%
Mix Ratio: By Weight By Volume	100 100	49 50
Worklife at 72 ± 3°F (20 g mixed):	Over 20 minutes	

3M™ Scotch-Weld™ Epoxy Adhesive EC-3333 B/A Technical Datasheet

Product Performance

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

The following performance data has been obtained in the 3M Laboratory under the conditions specified.

Aluminum to Aluminum Bonds

A. Overlap Shear - Primed Aluminum

The following data show typical values obtained with 3M™ Scotch-Weld™ Epoxy Adhesive EC-3333 B/A in aluminum overlap shear bonds. All tests were run on 1" wide x 1/2" overlap specimens cut from .063" thick 2024-T3 Alclad aluminum panels which had been FPL etched and primed with 3M™ Scotch-Weld™ Structural Adhesive Primer EC-3960. Bonds were cured for 7 days at 70-80°F under 2 psi pressure. Tests were conducted according to MMM-A-132B methods.

Test Temperature	Overlap Shear Strength
-67°F	4500 psi
75°F	5500 psi
160°F (30 minutes at 160°F)	2000 psi
75°F (after 14 days exposure to 160°F and 100% relative humidity)	5300 psi

B. Miscellaneous Tests - Unprimed Aluminum

The following data show typical values obtained with Scotch-Weld EC-3333 B/A Adhesive on unprimed, optimized FPL etched, 2024-T3 Alclad aluminum using MMM-A-132B test procedures. Scotch-Weld EC-3333 B/A Adhesive was cured for at least 5 days at 70-75°F under 2 psi pressure.

Description	Scotch-Weld EC-3333 B/A Adhesive Test Results
1. -67°F Tensile Shear	4440 psi
2. 75°F Tensile Shear	5300 psi
3. Fatigue Strength at 750 psi at 1800 cpm for 10 ⁶ cycles	no failures
4. Creep Rupture 192 hours at 75°F at 1600 psi	0.000 inch
5. Blister Detection	4200 psi
6. 75°F Tensile Shear after 30 days at 120°F and 95-100% RH	4950 psi
7. 75°F Tensile Shear after 7 days in JP-4	5600 psi
8. 75°F Tensile Shear after 7 days Hydraulic Oil	4800 psi
9. 75°F T-Peel (0.020 inch thick metal)	41 lb/inch

C. Floating Roller Peel

Floating Roller Peel specimens consist of one .063" x 8" x 8" 2024T3 alclad aluminum panel bonded to one .020" x 8" x 10" 2024T3 Alclad aluminum panel. The panels were phosphoric acid anodized (3M Test Method C-2780), and primed with 0.2 mils of Scotch-Weld EC-3960 Primer. They cured for 5 days at room temperature under 2 psi pressure. The panels were cut into 1" wide specimens, and tested using a jaw separation rate of 6"/minute according to ASTM D-3167.

Floating Roller Peel	Scotch-Weld EC-3333 B/A Adhesive Test Results
75°F	94 lb/inch width

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Product Application

Note: While this information is provided as a general application guideline based upon typical conditions, it is recognized that no two applications are identical due to, among other things, differing assemblies, methods of heat and pressure application production equipment and other limitations. It is therefore suggested that experiments be run, within the actual constraints imposed to determine optimum conditions for your specific application and to determine suitability of product for particular intended use.

I. Surface Preparation

A thoroughly cleaned, dry, grease-free surface is essential for maximum performance. Cleaning methods which will produce a break free water film on metal surfaces are generally satisfactory.

A. Aluminum: Optimized FPL Etch – 3M Test Method C-2803 or ASTM D2651 Method 8.

1. Alkaline degrease – Oakite® Aluminum Cleaner 164 solution 9-11 oz./gallon of water at $190^{\circ} \pm 10^{\circ}\text{F}$ for 15 ± 5 minutes. Rinse immediately in large quantities of cold running distilled, deionized, or tap water (3M Test Method C-2802).
2. Acid Etch – Immerse panels in the following solution for 10 minutes at $150^{\circ} \pm 5^{\circ}\text{F}$:

Sodium dichromate ($\text{Na}_2\text{Cr}_2\text{O}_7 \cdot 2\text{H}_2\text{O}$)	4.1 - 4.9 oz./gallon
Sulfuric Acid 66° Be	38.5 - 41.5 oz./gallon
2024-T3 aluminum (dissolved)	0.2 oz./gal. minimum
Tap Water as needed to balance	
3. Rinse immediately in large quantities of clear running tap water.
4. Air dry approximately 15 minutes followed by a force dry at $150^{\circ} \pm 10^{\circ}\text{F}$ for 10 minutes.
5. Current theory suggests that both surface structure and chemistry play a significant role in determining the strength and performance of bonded structure. It is therefore advisable to bond or prime freshly cleaned surfaces as early as possible after preparing to avoid contamination and/or mechanical damage.

B. Fiber Reinforced Epoxy Laminate Surface and Plastic Surfaces

1. Abrade surfaces to be bonded with 180 grit sandpaper or a 3M™ Scotch-Brite™ pad (do not cut through resin into reinforcing fibers).
2. Wipe with unsized cheese cloth soaked with Ketone type solvent such as Methyl Ethyl Ketone (MEK)*

*When using solvents, extinguish all ignition sources in the area, observe precautionary measures as well as all appropriate government and industry regulations.
3. Thoroughly dry before application of adhesive.

C. Primer Application

Although 3M™ Scotch-Weld™ Epoxy Adhesive EC-3333 B/A gives excellent performance on unprimed surfaces, the use of corrosion inhibiting primers such as 3M™ Scotch-Weld™ Structural Adhesive Primer EC-3960 or EC-3924B are suggested for maximum long-term durability and environmental resistance. See technical data sheets for application instructions. In the Typical Product Performance section, the Scotch-Weld EC-3960 Primer was cured for one hour at 250°F prior to bonding.

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Adhesive Application

A. Adhesive Mixing

3M™ Scotch-Weld™ Epoxy Adhesive EC-3333 B/A is supplied in dual plastic cartridges. To use, insert the dual syringe cartridge into an applicator and advance the plungers into the cylinders using light pressure on the trigger. Next remove the cap from the cartridge and expel a small amount of adhesive to be sure both sides of the cartridge are flowing evenly and freely. If automatic mixing of Part A and Part B is desired, attach a 6 inch or longer mixing nozzle to the cartridge and dispense the adhesive. If mixing a nozzle is not used, dispense both components into a container and thoroughly mix with a spatula until a uniform gray color is achieved.

Scotch-Weld EC-3333 B/A Adhesive is also available in kit form consisting of Part B (Base) and Part A (Accelerator). To use, measure 2 parts of base to 1 part of accelerator by volume (or 100 parts to 49 parts by weight). Mix thoroughly with spatula until it is a uniform gray color.

IMPORTANT: Be careful when mixing quantities larger than 50 grams (2 oz.) because an exothermic reaction may occur.

Apply adhesive to parts to be bonded and assemble bonds before the work life expires parts must be clamped or held together until cured.

B. Work Life

The work life of a 20 gram batch is over 20 minutes at 70-75°F. Larger quantities and/or higher temperatures will result in shorter work lives.

C. Curing Characteristics

The data reported in the Typical Product Performance section (on page 3) were developed using a cure of 5 to 7 days at 70-80°F and 2 psi bonding pressure. At 70-80°F, bonds of Scotch-Weld EC-3333 B/A Adhesive generally reach handling strength in 2 to 3 hours. Full cure is reached in 7 days. If faster cures are desired, bonds may be heated. At 120°F, full cure is reached in approximately 2 hours.

D. Cleanup

Excess filler and equipment may be cleaned prior to curing with toluene or Ketone solvents.*

*When using solvents, extinguish all ignition sources in the area, observe precautionary measures as well as all appropriate government and industry regulations.

Storage Stability

The standard shelf life for Scotch-Weld EC-3333 B/A Adhesive is 12 months from the date of shipment, when stored indoors in a dry place at 80°F or less in the original container.

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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, please visit www.3M.com/msds or call 1-800-364-3577 or (651) 737-6501.

For Additional Information

In the U.S., call toll free 1-800-235-2376, or fax 1-800-435-3082 or 651-737-2171. For U.S. Military, call 1-866-556-5714. If you are outside of the U.S., please contact your nearest 3M office or one of the following branches:

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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.

Product Use

Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

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78-6900-9570-4