Scotch-Weld™
Epoxy Adhesive
EC-2615 • EC-2615 LW

Technical Data **December, 2002**

Product Description

3M™ Scotch-Weld™ Epoxy Adhesive EC-2615 and EC-2615 LW (Long Worklife) are two component epoxy adhesives which cure at room temperature or with heat to form a tough, impact-resistance bond. They have excellent adhesion to many metal and plastic substrates.

Features

- High shear strength
- High peel strength
- Outstanding environmental resistance
- Easy mixing (kit or pre-measured no-mix available)
- Non-Sag (thixotropic)
- 20 minute worklife (Scotch-Weld EC-2615)
- 60 minute worklife (Scotch-Weld EC-2615 LW)

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.

	Scotch-Weld EC-2615		Scotch-Weld EC-2615 LW	
	Part B (Base)	**Part A (Accelerator)**	**Part B (Base)**	**Part A (Accelerator)**
Viscosity (Brookfield RVF): Approx.	800,000 cps	8,000 - 14,000 cps	800,000 cps	8,000 - 16,000 cps
Color:	Off White	Amber	Off White	Amber
Weight/Gallon:	9.3-9.7 lbs.	9.1-9.5 lbs.	9.3-9.7 lbs.	8.9-9.2 lbs.
Solids:	100%	100%	100%	100%
Mix Ratio: By Weight By Volume	100 100	49 50	100 100	48 50
Worklife at 72 ± 3°F (20 g mixed):	Over 20 minutes		Over 60 minutes	

Note: There is a third product 3M™ Scotch-Weld™ Epoxy Adhesive EC-2615 XLW (Extra Long Worklife) that has an 8 hour worklife and is similar in composition to Scotch-Weld adhesives EC-2615 and EC-2615 LW; however, a complete data sheet is not yet available.

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Typical Product Performance

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

Aluminum to Aluminum Bonds

A. Overlap Shear

The following data shows typical values obtained with 3M™ Scotch-Weld™ Epoxy Adhesive EC-2615 B/A and EC-2615 B/A LW in aluminum overlap shear bonds. All specimens were 2024-T3 alclad aluminum panels which had been FPL etched and primed with 3M™ Scotch-Weld™ Primer EC-3960. Bonds were cured for 7 days at 70-80°F under 2 psi pressure. Tests were conducted according to MMM-A-132 methods.

	Overlap Shear Strength	
Test Temperature	**Scotch-Weld EC-2615**	**Scotch-Weld EC-2615 LW**
75°F	5500 psi	5888 psi
160°F (30 minutes at 160°F)	2808 psi	3596 psi
75°F (after 14 days exposure to 160°F and 100% relative humidity)	4440 psi	5406 psi

B. MMM-A-132D Type I, Class 3, Form P, (Selected Tests)

All tests conducted on unprimed, FPL etched 2024-T3 alclad aluminum.

Cure 1: cured for 7 days at room temperature under 2 psi pressure
Cure 2: cured for 1 day at room temperature under 2 psi pressure, plus 1 hour at 180°F

	Scotch-Weld EC-2615		Scotch-Weld EC-2615 LW	
Description	**Cure 1**	**Cure 2**	**Cure 1**	**Cure 2**
1. 75°F Tensile Shear (psi)	4368	3872	5000	5288
2. 180°F Tensile Shear (psi)	460	953	727	1282
3. -67°F Tensile Shear (psi)	3678	6410	5282	3920
4. Fatigue Strength at 750 psi at 1800 cpm for 10^6 cycles	NF*	NF*	NF*	NF*
5. Creep Rupture 192 hours at 75°F at 1600 psi (in.)	0	0	0	0
6. Blister Detection (psi)	3842	3850	4152	4093
7. 75°F Tensile Shear after 30 days at 120°F 95-100% RH (psi)	3915	4077	4533	4360
8. 75°F Tensile Shear after 7 days in JP-4 (psi)	4000	4488	5100	4283
9. 75°F Tensile Shear after 7 days Hydraulic Oil (psi)	3338	4597	5253	4772

*No failures

Typical Product Performance *(continued)*

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

C. T-Peel

T-Peel specimens were made according to ASTM D1876-72 with 2024-T3 alclad aluminum sheets, 8 in. x 8 in. x .032 in. The surface preparation was the optimized FPL described below. The specimens were cured at a pressure of 2 psi for 7 days at 75°F. Typical glue line thicknesses were 0.010 in. - 0.018 in. 1 in. wide specimens were cut from the 8 in. wide specimens and were tested at a jaw separation rate of 20 in./minute under the conditions shown below.

Test Conditions	Scotch-Weld EC-2615	Scotch-Weld EC-2615 LW
75°F	73 piw	61 piw

D. Floating Roller Peel

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

Floating Roller Peel	Scotch-Weld EC-2615	Scotch-Weld EC-2615 LW
	98 piw	95 piw

*According to 3M Test Method C-2780

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 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 Company Test Method C-2803 or ASTM D2651

1. Alkaline degrease – Oakite 164 solution 9-11 oz./gallon of water at 190 ± 10° F for 10 to 20 minutes. Rinse immediately in large quantities of cold running water (Test Method C-2802).
2. Acid Etch – Immerse panels in the following solution for 10 minutes at 150 ± 5°F:

Sodium dichromate ($Na_2Cr_2O_7 \cdot 2H_2O$)	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	

   Note: Read and follow component supplier's environmental, health and safety recommendations before preparing this etch solution.
3. Rinse immediately in large quantities of clear running tap water.
4. Dry – Air dry approximately 15 minutes followed by a force dry at 150 ± 10°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.

Product Application *(continued)*

B. Fiber Reinforced Epoxy Laminate Surface and Plastic Surfaces

1. Abrade surfaces to be bonded with 180 grit sandpaper or a 3M™ Scotch-Brite™ Cleaning Pad (do not cut through resin into reinforcing fibers).
2. Wipe with clean rag or paper towel soaked with Ketone type solvent* such as Methyl Ethyl Ketone.*
   ***Note:** When using solvents extinguish all sources of ignition in the immediate work area and observe proper precautionary measures for handling such materials.
3. Thoroughly dry before application of adhesive.

II. Primer Application

Although 3M™ Scotch-Weld™ Epoxy Adhesive EC-2615 and EC-2615 LW give excellent performance on unprimed surfaces, the use of 3M™ Scotch-Weld™ Primers, EC-3960, EC-3924B, or EC-3963 corrosion inhibiting primers are suggested for maximum long-term durability and environmental resistance. See their data sheets for complete application instructions. These primers must be cured for one hour at 250°F prior to bonding. Review and follow MSDS prior to use.

Adhesive Application

A. Adhesive Mixing

Scotch-Weld adhesives EC-2615 and EC-2615 LW are supplied in dual plastic cartridges. To use, insert the dual syringe cartridge into an applicator gun 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 are desired, attach a 6 inch or longer mixing nozzle to the cartridge and dispense the adhesive. If nozzle mixing is not used, dispense both components into a container and thoroughly mix with a spatula until a uniform beige color is achieved.

Scotch-Weld adhesives EC-2615 and EC-2615 LW are available in kit form consisting of Part B (Base) and Part A (Accelerator). To use, measure out 2 parts of base to 1 part of accelerator by volume (100 to 49) or by weight (100 to 48). Mix thoroughly with spatula until it is a uniform beige color. CAUTION: Be careful mixing quantities larger than 50 grams (2 oz.) because an exothermic reaction will occur.

Apply adhesive to parts to 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 70-80°F for Scotch-Weld adhesive EC-2615 and over 60 minutes for Scotch-Weld adhesive EC-2615LW. Larger quantities and/or higher temperatures will result in shorter work lives.

C. Curing Characteristics

It is suggested using a cure of 7 days at 70-80°F and 2 psi bonding pressure. At 70-80°F, bonds of Scotch-Weld adhesive EC-2615 generally reach handling strength in 2 to 3 hours. Scotch-Weld adhesive EC-2615 LW generally reaches handling strength in 5 to 6 hours. Full cure is reached in 1 to 7 days. If faster cures are desired, bonds may be heated. At 120°F full cure is reached in approximately 2 hours. For higher performance at elevated temperatures, a post cure of 1 hour at 180°F is suggested.

D. Cleanup

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

***Note:** These solvents are flammable. When using solvents for cleanup it is essential that proper precautions are observed.

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Storage

Store these products indoors in a dry place at 60-80°F for the maximum shelf life.

Shelf Life

3M™ Scotch-Weld™ Epoxy Adhesive EC-2615 and EC-2615 LW is 12 months from the date of shipment.

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.

For Additional Information

For additional information call 1-800-235-2376. For Technical Service assistance, call 651-736-5954. Address correspondence to 3M Aerospace Lab, Technical Service, 3M Center, Building 209-2S-32, St. Paul, MN 55144-1000.

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ISO 9002

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

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