

3M

Scotch-Weld™

Structural Adhesive Primer

EC-3917

Technical Data

Issue No. 3

Introduction

3M™ Scotch-Weld™ Structural Adhesive Primer EC-3917 is a primer for 3M™ Scotch-Weld™ epoxy based film adhesives. EC-3917 primer contains a corrosion inhibitive pigment for added corrosion protection. Priming with EC-3917 offers the following advantages:

Advantages

- Insures complete wetting of the adhesive to the adherends
- Improves durability of bonded joint
- Protects cleaned surfaces
- Can be brushed or sprayed
- Can be used as a corrosion resistant coating

Description

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

Color:	Yellow – green
Base:	Synthetic Resin
Net Weight:	7.2 lbs./gallon (0.863 Kg/liter) [approximate]
Solids Content:	12 ± 1%
Flash Point:	20°F (-6.67°C) [Closed Cup]

Note: EC-3917 primer must be thoroughly stirred prior to use.

Product Performance

All data reported in this section is typical data obtained on EC-3917 primed aluminum surfaces. Prior to priming, the metal was etched as described in the surface preparation section of this data sheet. Where noted, the etch was followed by chromic acid anodization. After primer application and dry, the bonds were assembled and cured for 60 minutes at 350°F (177°C) (250°F [121°C] for the 3M™ Scotch-Weld™ Film Adhesive AF 126 series and AF 163-2 series). A 4-5°F/minute (2.2-2.8°C/minute) rise rate to temperature and 45-50 psi (3.1-3.4 bar) pressure was used. Parts were cooled to below 200°F (93°C) before the pressure was removed.

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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.

1. Metal to Metal – Overlap Shear

All properties were measured on 1" wide, 1/2" overlap specimens cut from 0.063" thick 4" x 7" bonded panels of 2024-T3 alclad aluminum. Tests were conducted per MMM-A-132.

Note: AF 163-2K (.06 wt.) tests were conducted on unsealed chromic acid anodized panels. (See 3M Test Method C-2801.)

Test Temperature	3M Adhesives AF 126-2 (.06 wt.)		AF 147 (.075 wt.)		AF 143-2 (.10 wt.)		AF 163-2K (.06 wt.)	
-67°F (-55°C)	3000 psi	20.7 MPa	3500 psi	24.1 MPa	2600 psi	17.9 MPa	6000 psi	41.3 MPa
75°F (24°C)	4000 psi	27.6 MPa	4500 psi	31.0 MPa	3250 psi	22.4 MPa	5800 psi	40.0 MPa
250°F (121°C)	700 psi	4.8 MPa	3500 psi	24.1 MPa	2700 psi	18.6 MPa	1500 psi	10.3 MPa
300°F (149°C)	not tested	not tested	2200 psi	15.2 MPa	2700 psi	18.6 MPa	not tested	not tested

2. Metal to Metal – T-Peel

T-Peel strength was measured on 1" wide specimen cut from unsealed, chromic acid anodized, 8" x 8" x .020" bonded panels of 2024-T3 alclad aluminum. Tests were conducted per MMM-A-132.

Test Temperature	3M Adhesives AF 126-2 (.06 wt.)		AF 147 (.075 wt.)		AF 143-2 (.10 wt.)	
-67°F (-55°C)	25 piw	111.2 N/25mm	25 piw	111.2 N/25mm	30 piw	133.4 N/25mm
75°F (24°C)	30 piw	133.4 N/25mm	30 piw	133.4 N/25mm	45 piw	200.2 N/25mm
180°F (82°C)	25 piw	111.2 N/25mm	25 piw	111.2 N/25mm	35 piw	155.7 N/25mm

3. Metal to Metal Floating Roller Peel

Peel strength was measured on 1" wide specimens cut from a 3" x 8" x .063" 2024-T3 bare aluminum panel bonded to a 3" x 10" x .025" 2024-T3 bare panel. Tests were conducted per ASTM D-3167.

Test Temperature	3M Adhesives AF 126-2 (.06 wt.)		AF 147 (.075 wt.)		AF 143-2 (.10 wt.)	
75°F (24°C)	50 piw	222.4 N/25mm	30 piw	133.4 N/25mm	6 piw	26.7 N/25mm

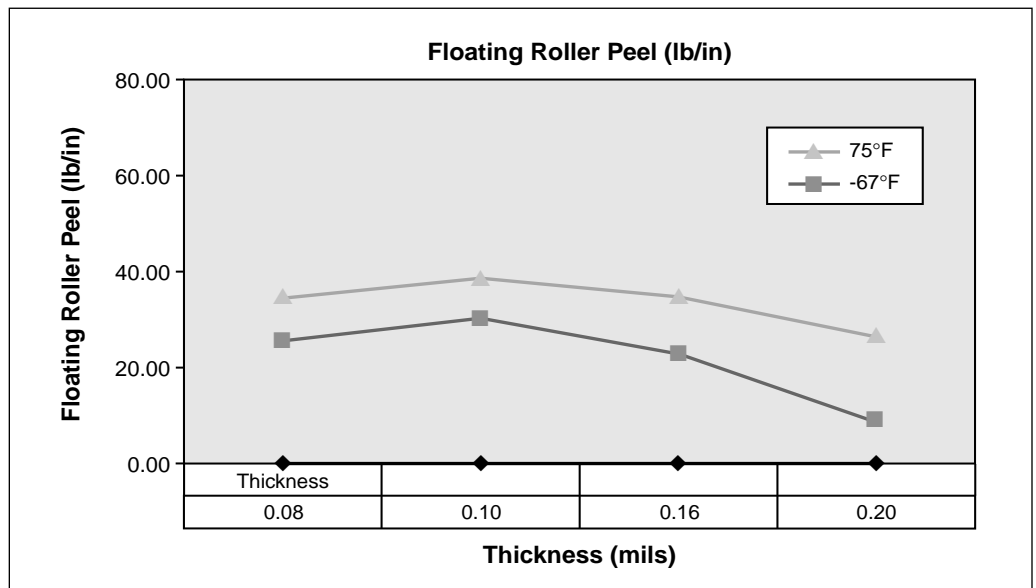
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Product Performance
(continued)

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

EC-3917 with 3M™ Scotch-Weld™ Structural Adhesive Film AF 191M (.035 wt.) Floating Roller Peel Result at -67°F (-55°C) and 75°F (24°C) versus Primer Thickness

Primer Thickness (mil)	(lb/in) -67°F (-55°C)	(lb/in) RT
0.08	26	37
0.10	31	39
0.16	23	36
0.20	9	28



4. Resistance to Environment Exposure

When used as a primer, EC-3917 resists attack by salt spray, high humidity, and aircraft test fluids.

Given below is typical data obtained on AF 126-3 (.06 wt.) on EC-3917 primed aluminum prepared as in section 1. Metal to Metal – Overlap Shear. The overlap shear and environmental tests were conducted according to MMM-A-132.

Test – 75°F (24°C) overlap shear	AF 126-3 (.06 wt.)/EC-3917	
Unexposed control	4500 psi	31.0 MPa
After 30 days at 120°F (49°C) and 95-100% Rel. Humidity	3800 psi	26.2 MPa
After 30 days exposure to Salt Water Spray	4100 psi	28.3 MPa
After 30 days immersion in Tap Water at 75°F (24°C)	4600 psi	31.7 MPa
After 7 days immersion in JP-4 Fuel at 75°F (24°C)	5020 psi	34.6 MPa
After 7 days immersion in MIL-F-5566 Anti Icing Fluid	4500 psi	31.0 MPa
After 7 days immersion in MIL-H-5606 Hydraulic Oil	5170 psi	35.6 MPa
After 7 days immersion in Type III Hydrocarbon Fluid	4980 psi	34.3 MPa

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Application Proper primer application is as important as proper bond design and adhesive choice to obtain maximum joint properties. Improper adhesive application techniques can result in partial or complete failure of an assembly.

EC-3917 primer will give excellent results under the following suggested procedures. Variations from these procedures should be fully evaluated to insure bond properties sufficient to meet the requirements of your particular assembly.

Surface Preparation **Suggested Cleaning Procedures for Aluminum**

A thoroughly cleaned, dry, grease-free surface is essential for maximum performance. Cleaning methods which will produce a breakfree water film on metal surfaces are generally satisfactory. Surface preparation should be fully evaluated with the adhesive, especially if resistance to specific environments is anticipated.

1. Alkaline Degrease – Oakite 164 solution (9-11 oz./gal. water) at 190°F ± 10°F (87 ± 5.6°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.

***Note:** Review and follow safety and health information provided by suppliers of these materials prior to preparation of this solution.

To FPL etch panels, place them in the above solution at 150 to 160°F (66 to 71°C) for 12 to 15 minutes.

3. Rinse – Rinse panels in clear running water.
4. Dry – Air dry 30 minutes; force dry 30 minutes at 140°F (60°C).
5. It is advisable to coat the freshly cleaned surfaces with EC-3917 within four (4) hours after surface preparation.
6. Care should be taken to avoid contaminating the cleaned aluminum by any substance which will hinder the wetting action of EC-3917.

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Surface Preparation
(continued)

Primer Application: EC-3917 is satisfactorily applied by brush coating to spraying. Primer must be thoroughly stirred just prior to application.

Spray Gun

A. Spray Procedure	DeVILBISS JGA	Binks No. 62
Air Cap	30	66SD
Fluid Tip and Needle	AV-15-FX	66-365
Cup Pressure	2-4 psi (13.78-27.56 MPa)	Siphon Feed
Line Pressure	30 psi (0.207 MPa)	30 psi (0.207 MPa)
Distance from Panel	9 ± 3 in. (228.6 ± 76.2 mm)	6-9 in. (152.4-228.6 mm)
Primer Thickness	00005-00015 in. (1.27-3.81 micron)	
Primer Weight	140-420 mg/sq. ft.	

B. Primer Dry and Cure

Air dry for 30 minutes minimum at 75°F (24°C) followed by force cure for 60 minutes at 250°F (121°C).

Note: The above primer application procedures will give satisfactory performance with 3M™ Scotch-Weld™ Epoxy Adhesives. However, review the particular product technical sheet for the optimum primer application to be used with that product.

The primed surface should be protected from contamination introduced by dust, fingerprints, oil, etc.

If extended periods of storage are required, wrap the parts in unplasticized Kraft paper. If the cured, primed surface is contaminated with dust, it may be cleaned prior to bonding by wiping with clean unsized cheesecloth and ketone* type solvents.

Cleanup: Excess primer and equipment may be cleaned up, prior to curing with ketone* type solvents.

*When using solvents, extinguish all sources of ignition in the area, review and follow suppliers precautionary information prior to handling these materials.

Adhesive: EC-3917 primer performs satisfactorily with AF 126, AF 126-2, AF 143-2, AF 147, AF 453-2, AF 191, AF 163-2 and AF 163-3M™ Scotch-Weld™ Structural Adhesives. See respective technical data sheet for adhesive application.

Storage & Handling

Storing and Aging Precautions – Avoid heat and dampness in storage. Store new shipments behind older lots. Refrigerated or freezer storage, 40°F (4.4°C) or below is recommended for EC-3917. Rotate stock on a “first in – first out” basis.

Caution: Primer should be permitted to thoroughly warm to room temperature before being used in order to prevent moisture condensation.

3M Standard shelf life of EC-3917 primer is 6 months from date of shipment from 3M when stored at 40°F (4.4°C) or below in its original unopened container.

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Precautionary Information

See 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

To request additional product information or to arrange for sales assistance, call toll free (800) 235-2376. Our fax number is (417) 869-5219. Address correspondence to: 3M Aerospace Central, 3211 E. Chestnut Expressway, Springfield, MO 65802.

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This Adhesives 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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