

**3M**

# Scotch-Weld™ Structural Adhesive Primer EW-5000 AS

**Technical Data****May, 2006**

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**Product Description**

3M™ Scotch-Weld™ Structural Adhesive Primer EW-5000 AS is a sprayable, low VOC, heat curing, structural adhesive primer that contains a non-chromated, corrosion inhibiting package to provide protection against corrosive environments. Scotch-Weld EW-5000 AS primer is designed to provide ambient temperature drying with handleability right after spraying. Scotch-Weld EW-5000 AS primer meets the South Coast Air Quality Management District (SCAQMD) Rule 1124 VOC limit with less than 250 g per liter.

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**Key Features**

- Non-chromate corrosion inhibiting package for corrosion protection
- VOC less than 250 g/L (meets SCAQMD Rule 1124)
- Can be sprayed to target thickness, 0.20 - 0.25 mil (5 - 6 µm), within one box coat (2 passes)
- Handleable prior to the bake cycle (no pre-bake required)
- Uses conventional spraying and drying (curing) equipment
- Shop friendly application characteristics
- Thickness range for performance: 0.12 - 0.40 mil (3 - 10 µm)
- Hot/Wet durability
- Pre-bake thickness can be checked by a gauge or a color chart
- Can be brush applied

## Technical Data

### 3M™ Scotch-Weld™ Structural Adhesive Primer EW-5000 AS

#### Typical Uncured Physical Properties

**Note: The following technical information and data is based upon limited 3M testing conditions and should not be used for specification purposes.**

Color:	Green
Base:	Epoxy
Vehicle:	Distilled water and small amounts of co-solvents
Solid Content:	31 ± 1%
VOC with Exempt Solvents:	225 g/L (calculated)
Net Weight:	8.9 lbs/gallon (1.06 g/cc)
Storage:	35-45°F (1-7°C) [DO NOT FREEZE]

#### Typical Cured Physical Properties

**Note: The following technical information and data is based upon limited 3M testing conditions and should not be used for specification purposes.**

##### I. Key Specifications

Appearance:	Glossy to Semi-Glossy
Air Dry Tack:	None
Pencil Hardness:	>7H <sup>1</sup>
40 Day Salt Spray Exposure:	Pass <sup>2</sup>
Min. Thickness to MEK Resistance:	0.10 - 0.12 mil (2.5 - 3.0 μ) <sup>3</sup>
Max. Thickness for Peel Performance:	0.40 - 0.42 mil (10.0 - 10.7 μ) <sup>4</sup>

##### II. Wide Area Shear

Adhesive: 3M™ Scotch-Weld™ Structural Adhesive Film AF 163-2M, .06 wt.

Adhesive Cure: 250°F (121°C) – 90 minutes – 50 psi (3.45 x 10<sup>5</sup> Pa) – 5.8°F/min rise rate (3.2°C/min).

Primer Cure: 30 min air dry followed by 60 min bake at 250°F (121°C).

Primer Thickness: 0.20 - 0.25 mil (5 - 6 μ).

- 67°F (-55°C)	5800 psi (40 MPa)
75°F (24°C)	5800 psi (40 MPa)
180°F (82°C)	4100 psi (28 MPa)
250°F (121°C)	2200 psi (15 MPa)
75°F (24°C) after 30 days at 100% RH / 120°F (49°C)	5500 psi (38 MPa)
75°F (24°C) after 30 days salt spray 95°F (35°C)	5700 psi (39 MPa)
75°F (24°C) after 7 days in jet fuel	5700 psi (39 MPa)
75°F (24°C) after 7 days in Skydrol® at 150°F (65°C)	5900 psi (41 MPa)

Tested according to ASTM D3165, crosshead speed of .05 in/min.

<sup>1</sup>Tested according to ASTM D3363.

<sup>2</sup>No degradation on primer or metal was found beyond the scribe lines with both 2024 T3 bare and Alclad substrates. An example of a 40-day exposed panel.

2024 T3 Bare Aluminum Alloy; Phosphoric anodized; Primer thickness: 0.14 mil; The scribes were machine made with width of 0.062 in; Tested according to ASTM B117.

<sup>3</sup>Tested according to ASTM D5402.

<sup>4</sup>See metal-to-metal climbing drum peel data Section III of Typical Cured Physical Properties.



## Technical Data

### 3M™ Scotch-Weld™ Structural Adhesive Primer EW-5000 AS

#### Typical Cured Physical Properties (continued)

**Note: The following technical information and data is based upon limited 3M testing conditions and should not be used for specification purposes.**

#### III. Metal/Metal Climbing Drum Peel

Adhesive: 3M™ Scotch-Weld™ Structural Adhesive Film AF 163-2OST, .06 wt.  
 Adhesive Cure: 250°F (121°C) – 90 minutes – 50 psi (3.45 x 10<sup>5</sup> Pa) – 5.8°F/min rise rate (3.2°C/min).  
 Primer Cure: 30 min air dry followed by 60 min bake at 250°F (121°C).  
 Primer Thickness: 0.20 - 0.25 mil (5 - 6 μ).

Primer Thickness Mil (μ)	Peel Strength In-lb/in (mm-Kg/mm)	Adhesive Cohesive Failure Mode
0.26 (6.6)	83.5 (37.9)	100%
0.29 (7.4)	87.8 (39.8)	100%
0.31 (7.9)	84.8 (38.5)	100%
0.35 (8.9)	85.6 (38.8)	100%
0.36 (9.1)	83.5 (37.9)	98%
0.37 (9.4)	82.6 (37.4)	100%
0.38 (9.7)	77.1 (35.0)	100%
0.40 (10.2)	80.9 (36.7)	99%
0.42 (10.7)	85.4 (38.7)	98%
0.47 (11.9)	84.3 (38.2)	97%

The results are averages from several separate tests. Tested according to ASTM1781 except at crosshead speed of 3 in/min (76 mm/min).

#### IV. Flatwise Tensile

Adhesive: 3M™ Scotch-Weld™ Structural Adhesive Film AF 163-2M, .06 wt.  
 Adhesive Cure: 250°F (121°C) – 90 minutes – 50 psi (3.45 x 10<sup>5</sup> Pa) – 5.8°F/min rise rate (3.2°C/min).  
 Core: 1/4" cell, 0.625" thick, PAA treated 5052 alloy, 4-mil foil, non-perforated.  
 Primer Cure: 30 min air dry followed by 60 min bake at 250°F (121°C).  
 Primer Thickness: 0.20 - 0.25 mil (5 - 6 μ).

75°F (24°C)	1600 psi (11 MPa)
180°F (82°C)	860 psi (5.9 MPa)
250°F (121°C)	160 psi (1.1 MPa)

Tested according to ASTM C297; Test speed was set so as to produce failure within 3-6 min.

#### V. Honeycomb Peel

Adhesive: Scotch-Weld AF 163-2M, .06 wt.  
 Adhesive Cure: 250°F (121°C) – 90 minutes – 50 psi (3.45 x 10<sup>5</sup> Pa) – 5.8°F/min rise rate (3.2°C/min).  
 Primer Cure: 30 min air dry followed by 60 min bake at 250°F (121°C).  
 Primer Thickness: 0.20 - 0.25 mil (5 - 6 μ).

75°F (24°C)	79 in-lb/3-in (910 mm-Kg/76-mm)
75°F (24°C) after 30 days at 100% RH / 95°F (35°C)	80 in-lb/3-in (920 mm-Kg/76-mm)
75°F (24°C) after 30 days salt spray 95°F (35°C)	80 in-lb/3-in (920 mm-Kg/76-mm)

Tested according to ASTM1781 except at crosshead speed of 3 in/min (76 mm/min).

## Technical Data

### 3M™ Scotch-Weld™ Strucural Adhesive Primer EW-5000 AS

#### Typical Cured Physical Properties (continued)

**Note: The following technical information and data is based upon limited 3M testing conditions and should not be used for specification purposes.**

#### VI. Other Performance Tests

Adhesive Cure: 250°F (121°C) – 90 minutes – 50 psi (3.45 x 10<sup>5</sup> Pa) – 5.8°F/min rise rate (3.2°C/min).

Primer Cure: 30 min air dry followed by 60 min bake at 250°F (121°C).

Primer Thickness: 0.20 - 0.25 mil (5 - 6 μ).

Tests	Adhesive	Test Condition	Results
Wedge Crack <sup>1</sup>	3M™ Scotch-Weld™ AF163-2K .06WT	100% RH / 140°F (60°C) for 7 days	100% cohesive failure, crack length less than 0.25 in (6 mm)
Slow Cycle Fatigue	3M™ Scotch-Weld™ AF163-2M .06WT	100% RH / 140°F (60°C); 1500 psi (10.3 MPa); 5 cycles/hr	> 1700 cycles
Fatigue <sup>2</sup>	3M™ Scotch-Weld™ AF163-2M .06WT	Ambient condition; 30 Hz at 1500 psi (10.3 MPa)	> 2x10 <sup>6</sup> cycles

<sup>1</sup>Tested according to ASTM D3762.

<sup>2</sup>Tested according to ASTM D3166.

#### Product Application

**Note: This information is provided as a general application guideline based upon typical conditions. No two applications are identical due to differing assemblies, method 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, and grease free surface is essential for maximum performance. Cleaning methods which will produce a break free water film on metal surfaces are generally satisfactory.

The best performance will be achieved with the surface preparation by alkaline (e.g. Oakite™ 164 or Isoprep™ 44 solutions) degreasing, then FPL etching, according to ASTM D2674, and followed by phosphoric acid anodizing, according to ASTM D3933.

#### II. Agitation

Always mix well before transferring 3M™ Scotch-Weld™ Adhesive Primer EW-5000 AS to the spray system. Mixing can be achieved by the following operations:

- Roller mixer.** Place the primer on the roller mixer, and let it roll for 20 minutes.
- Mechanical stirrer.** Use a propeller type blade. Stir at medium low speed (100 - 150 rpm) for 15 - 20 minutes.
- Paint shaker.** Use with caution. Do not shake for more than 5 minutes. Otherwise excessive foam can form.

## Technical Data

### 3M™ Scotch-Weld™ Strucural Adhesive Primer EW-5000 AS

**Product Application** (continued) **Note:** This information is provided as a general application guideline based upon typical conditions. No two applications are identical due to differing assemblies, method 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.

### III. Spray Procedure

#### 1) Equipment and settings:

Spray Equipment	Conventional HVLP spray gun <sup>1</sup> , e.g. 3M™ PPS™ Paint Preparation System HVLP Spray Gun Part #16212 <sup>2</sup> Accuspray® Series 12 HVLP Spray Gun Binks® Mark 1 HVLP Spray Gun
Fluid and Air Nozzle	1.3 mm or less for siphon or gravity feed guns 1.0 mm or less for pressure feed guns
Atomizing Pressure	6 - 10 psi (40 - 69 kilopascal) at the air cap (gun tip) <sup>3</sup>
Fluid Nozzle Setting	1/2 - 3/4 turn out from close position
Fan Pattern	Adjust fan pattern control to provide about 45 - 60 spray pattern
Gun Distance	6 - 12 inch (15 - 30 cm) from the panel

<sup>1</sup>Can be either a siphon or gravity-feed gun.

<sup>2</sup>PPS Part #16212 comes with a kit that contains a fluid nozzle of 1.3 mm tip.

<sup>3</sup>For 3M™ PPS™ Paint Preparation System Spray Gun, set the pressure just below the purple zone at the gauge attached to the gun.

#### 2) Spray Process

- Make sure to let the primer warm up to ambient temperature before spray. Preferably 65°F (18°C) or higher, but not to exceed 95°F (35°C).
- The spray of water-borne products varies with temperature and humidity conditions. To assure good spray appearance, the booth temperature should be above 70°F (21°C), and humidity should be below 50%.
- For best post-cured appearance, allow flash-off between passes. At high humidity and low temperature conditions, spray less material each pass, and allow extra passes to achieve the designated thickness.
- A training DVD is available through your 3M Aerospace Sales Representative.

### IV. Primer Dry and Cure

Air Dry            30 minutes at 75 ± 5°F (24 ± 3°C), followed by  
Cure                60 minutes at 250 ± 5°F (121 ± 3°C)

### V. Primer Thickness

Optimal thickness:<sup>1,2</sup> 0.15 - 0.25 mil (3.8 - 6.4 µm) after cure.

<sup>1</sup>Primer thickness can be measured after the primer has flash dried, yet before bake. If thickness is measured before bake, about 0.02 - 0.05 mil (0.5 - 1.2 µm) shrinkage will occur after bake.

<sup>2</sup>The recommended thickness should be achieved within 2 to 3 passes (or 1 to 1.5 box coats) depending on temperature and humidity. One box coat is defined as two passes, perpendicular to each other.

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#### Storage

3M™ Scotch-Weld™ Structural Adhesive Primer EW-5000 AS should be stored at refrigerated conditions, e.g. 35-45°F (1-7°C). DO NOT FREEZE. The shelf life under this condition is 1 year from date of shipment.

Scotch-Weld EW-5000 AS primer should be permitted to thoroughly warm to room temperature in a sealed container before being used in order to provide its normal spray and drying characteristics. However, do not expose it to temperatures above 100°F (38°C) for a prolonged period of time.<sup>1</sup>

The out time of Scotch-Weld EW-5000 AS primer is 30 days under 80°F (27°) and 7 days at 90°F (32°C).

<sup>1</sup>The primer should not be exposed for more than 24 hours at 100°F (38°C) and should not be exposed for more than 1 hour at 120°F (49°C).

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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 or visit [www.3M.com/msds](http://www.3M.com/msds).

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#### For Additional Information

To request additional product information or to arrange for sales assistance, 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 or fax 651-737-4380. If outside of the U.S., please contact your nearest 3M office.

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**AS9100**

This product was manufactured under a 3M quality system registered to AS9100 standards.



#### Aerospace and Aircraft Maintenance Department

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