

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

Technical Data Sheet

Product Description

3M™ Scotch-Weld™ Structural Adhesive Primer EW-5000 is a sprayable, water-based, heat curing, corrosion inhibiting epoxy primer that can provide protection against corrosive environments. Scotch-Weld EW-5000 primer is designed to provide ambient temperature drying with handleability prior to the bake cycle.

Key Features

- Corrosion inhibiting package for excellent corrosion protection
- Can be sprayed to target thickness, 0.20 to 0.25 mil (5 to 6 μ), within one box coat (2 passes)
- High spray transfer efficiency
- 3 to 6 times higher coverage compared to solvent-borne primers
- Handleable prior to the bake cycle (no pre-bake required)
- Can be brush applied
- Pre-bake thickness can be checked by a gauge or a color chart
- Uses conventional spraying and drying (curing) equipment
- Hot/Wet durability
- BMS 5-89 and BMS 5-137 qualified

Typical Properties of Liquid Primer

Color	Yellow
Base	Epoxy Resin
Vehicle	Distilled water and small amounts of co-solvents
Net Weight	8.9 lbs/gallon (1.06 g/cc)
Solids Content	31.0 ± 1.5%
Corrosion Inhibitor Content	14.7 ± 1.5% per total non-volatiles
Storage	35 to 45°F (1 to 7°C) [DO NOT FREEZE]

Typical Cured Physical Properties

Note: The following technical information and data are based upon limited 3M testing conditions and are considered typical values and should not be used for specification purposes.

I. Key Specifications

Appearance	Glossy to Semi-glossy
Air Dry Tack	None
40 Day Salt Spray Exposure	Pass ¹
Pencil Hardness	7H ²
Pencil Hardness after 7 days in Skydrol®	7H ²
Min. Thickness to MEK Resistance	0.10 to 0.14 mil (2.5 to 3.6 μ) ³
Max. Thickness for Peel Performance	0.38 to 0.40 mil (9.7 to 10.2 μ) ⁴

¹Tested according to ASTM B117 with 1/16 inch wide scribed lines. After 40 days, no corrosion was developed either beyond or inside the scribed lines. No pitting corrosion was developed when primer thickness was greater than 0.06 mil. See Product Application section for cure cycle.

²Tested according to ASTM D3363.

³Tested according to ASTM D5402.

⁴See metal-to-metal climbing drum peel data in section III of the Typical Cured Physical Properties

II. Metal to Honeycomb Flatwise Tension

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

Adhesive Cure: 50 psi (0.35 MPa), 4°F/min (2.2°C/min) rise rate to 250°F (121°C) for 90 min.

Core: 1/4" cell, 0.625" thick, PAA treated 5052 Alloy, 4-mil foil, non-perforated.

Primer Cure: 30 minutes air dry followed by 60 minutes bake at 260°F (127°C).

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

Test Temperature	Flatwise Tensile Shear Strength
75°F (24°C)	1600 psi (11.0 MPa)
180°F (82°C)	860 psi (5.9 MPa)
250°F (121°C)	125 psi (0.86 MPa)

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

III. Metal/Metal Climbing Drum Peel

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

Adhesive Cure: 50 psi (0.35 MPa), 4°F/min (2.2°C/min) rise rate to 250°F (121°C) for 90 minutes.

Primer Cure: 30 minutes air dry followed by 60 minutes bake at 260°F (127°C).

Primer Thickness mil (μ)	Peel Strength In-lb/in (mN/m)	Percentage Cohesive Failure Mode
0.24 (6.1)	82.5 (367.5)	100%
0.33 (8.4)	79.0 (351.9)	100%
0.35 (8.9)	78.9 (351.4)	100%
0.36 (9.1)	81.4 (362.6)	100%
0.37 (9.4)	82.6 (367.9)	100%
0.38 (9.7)	80.1 (356.8)	99%
0.40 (10.2)	79.7 (355.0)	98%
0.41 (10.4)	76.5 (340.8)	88%

Tested according to ASTM 1781, crosshead speed of 3 in/min (76 mm/min).

Note: The following technical information and data are based upon limited 3M testing conditions and are considered typical values and should not be used for specification purposes.

IV. Wide Area Shear

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

Adhesive Cure: 50 psi (0.35 MPa), 4°F/min (2.2°C/min) rise rate to 250°F (121°C) for 90 min.

Primer Cure: 30 minutes air dry followed by 60 minutes bake at 260°F (127°C).

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

-67°F (-55°C)	5000 psi (34 MPa)
75°F (24°C)	5000 psi (34 MPa)
180°F (82°C)	4000 psi (28 MPa)
250°F (121°C)	2000 psi (14 MPa)
75°F (24°C) after 30 days at 100% RH / 120°F (49°C)	5200 psi (36 MPa)
75°F (24°C) after 30 days salt spray at 95°F (35°C)	5600 psi (39 MPa)
75°F (24°C) after 7 days in JP-4 fuel at 75°F (24°C)	4600 psi (32 MPa)
75°F (24°C) after 7 days in hydrocarbon fluid (TT-S-735) at 75°F (24°C)	4800 psi (33 MPa)
75°F (24°C) after 7 days in Skydrol® at 150°F (65°C)	5700 psi (39 MPa)

Tested according to ASTM D3165, crosshead speed 0.05 in/min.

V. Honeycomb Peel

Adhesive: 3M™ Scotch-Weld™ Structural Adhesive Film AF 163-2M, .06 wt.
Adhesive Cure: 50 psi (0.35 MPa), 4°F/min (2.2°C/min) rise rate to 250°F (121°C) for 90 min.
Core: 1/4" cell, 0.625" thick, PAA treated 5052 Alloy, 4-mil foil, non-perforated.
Primer Cure: 30 minutes air dry followed by 60 minutes bake at 260°F (127°C).
Primer Thickness: 0.20 to 0.25 mil (5 to 6 μ).

75°F (24°C)	84 in-lb/in ³ (124.7 mN/m)
75°F (24°C) after 30 days at 100% RH / 95°F (35°C)	83 in-lb/in ³ (123.2 mN/m)
75°F (24°C) after 30 days salt spray at 95°F (35°C)	82 in-lb/in ³ (121.8 mN/m)

Tested according to ASTM 1781, crosshead speed of 3 in/min (76 mm/min).

VI. Other Performance Tests

Adhesive Cure: 50 psi (0.35 MPa), 4°F/min (2.2°C/min) rise rate to 250°F (121°C) for 90 min.
Primer Cure: 30 minutes air dry followed by 60 minutes bake at 260°F (127°C).
Primer Thickness: 0.20 to 0.25 mil (5 to 6 μ).

Tests	Adhesives	Test Conditions	Results
Wedge Crack ¹	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	AF163-2M .06WT	100% RH / 140°F (60°C); 1500 psi (10.3 MPa); 5 cycles/hr	> 2000 cycles
Fatigue ²	AF163-2M .06WT	Ambient condition; 30 Hz at 1500 psi (10.3 MPa)	> 2.0x10 ⁷ cycles

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. Metal Surface Preparation

A thoroughly cleaned, dry, grease-free surface is essential for maximum performance. Cleaning methods that 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 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™ Structural Adhesive Primer EW-5000 to the spray system. Mixing can be achieved by the following options:

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

III. Spray

1. Equipment and setting:

Spray Equipment	Conventional HVLP spray gun ¹ , e.g. 3M™ Series 12S Spray Gun Part #685122 3M™ Accuspray™ Spray Gun Model HG14, 1.4mm, #16577
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 to 10 psi (40 to 69 kilopascal) at the air cap (gun tip) ³
Fluid nozzle Setting	1/2 to 3/4 turn out from close position
Fan Pattern	Adjust fan pattern control to provide about 45 to 60 spray pattern
Gun Distance	6 to 12 inch (15 to 30 cm) from the panel

¹Can be either a siphon or gravity-feed gun.

²3M Series 12SPart #68512 comes with a kit that contains a 0.9mm and 1.3mm fluid nozzle tip.

³For 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-based 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.

IV. Primer Thickness

Optimal thickness: 0.18 to 0.28 mil (4.5 to 7.0 micrometer) after cure.^{1,2}

V. Drying and Bake

Air-Dry: 30 minutes at 75 ± 5°F (24 ± 3°C), followed by.

Bake: 60 minutes at 250 ± 10°F (121 ± 6°C).

Shelf Life and Stability

3M™ Scotch-Weld™ Structural Adhesive Primer EW-5000 shelf life is 12 months from the date of shipment when stored between 35° to 45°F (1° to 7°C) in the original unopened container. DO NOT FREEZE. Containers should be agitated after 6 months of storage at customer site.

Scotch-Weld EW-5000 primer should be warmed thoroughly to room temperature before use. However, do not expose it to above 100°F (38°C) for a prolonged period of time.³

The out time of Scotch-Weld EW-5000 primer is 15 days under 80°F (27°C), and 7 days at 90°F (32°C).

¹Primer thickness can be measured after the surface is flashed off, yet before bake. If thickness is measured before bake, about 0.02 to 0.05 mil (0.5 to 1.2 micrometer) shrinkage will occur after bake.

²The recommended thickness should be achieved within 2 to 3 passes (or 1 to 1.5 box coats) depending on temperature and humidity.

³The primer should not be exposed for more than 24 hours at 100°F (38°C), and should not be more than 1 hour at 120°F (49°C).

Precautionary Information

Refer to Product Label and Safety Data Sheet (SDS) for health and safety information before using this product. Always wear personal protection equipment, such as half or full face piece air purifying respirator suitable for organic vapors and particulates.

**These products were manufacture under a 3M Quality Management System registered to the AS9100 standard*

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