Scotch-Weld™
Structural Adhesive
EC-1648 B/A

Technical Data **June, 2002**

Introduction

3M™ Scotch-Weld™ Structural Adhesive EC-1648 B/A is a two part 75°F (24°C) curing adhesive designed for bonding polyester and metal panels to themselves and each other. It has similar properties to 3M™ Scotch-Weld™ Epoxy Adhesive EC-1838 B/A with increased high temperature resistance. It offers the following advantages:

- Cures to a strong durable bond in 24-48 hours at 75°F (24°C).
- Paste viscosity which allows the use of Scotch-Weld EC-1648 B/A on vertical or overhead surfaces with little or no tendency to flow.
- Good adhesion to steel.
- Good retention of strength after aging in many environments.

Product Description

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

	(B) Base	(A) Accelerator
Color:	White	Green
Base:	Modified Epoxy	Synthetic Resin
Weight/Gallon:	10.9 lbs./gal.	8.7 lbs./gal.
Viscosity:	Heavy Paste	Heavy Paste
Solids:	100%	100%
Work Life:	Approximately 60 Min.	Approximately 60 Min.
Mix Ratio:	3 parts by wt.	2 parts by wt.

Product Application

Proper adhesive 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.

Scotch-Weld EC-1648 B/A performance data reported in later section (Test Results) was developed using 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

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.

Product Application ***(continued)***

Aluminum

1. Vapor Degrease – Hang face sheets in condensing vapors of perchloroethylene for 5 minutes.
2. Alkaline Degrease – Immerse face sheets Oakite No. 164 solution (9-11 oz./gallon water) at 180-200°F (82-93°C) for 10-20 minutes. Rinse in generous quantities of clear running water.
3. Acid Etch – Place face sheets in either of the following solutions for 10 minutes at 150 ± 5°F (66 ± 2°C).

	A	**B**
Distilled Water	30 parts by wt.	30 parts by wt.
Sulfuric Acid (Conc.)	10 parts by wt.	10 parts by wt.
Sodium Dichromate	1 part by wt.	4 parts by wt.

4. Rinse – Rinse face sheets in clear running water.
5. Dry – Air dry 15 minutes; force dry 10 minutes with parts at 150 ± 5°F (66 ± 2°C).
6. If primer is used, priming should be done within 4 hours after surface preparation.

Adhesive Mixing

Mix only those amounts of adhesive which can be used within the work life of the mixture. To achieve optimum physical properties of the adhesive, mixing of the base and accelerator must be very thorough. Care should be taken not to incorporate excessive air into the adhesive during the mixing and application as the entrapped air will tend to give a porous and weakened bond. When weighing the components, be sure that containers are free of wax or oil. When thoroughly mixed, the adhesive should be a uniform green color. As a final check to insure that the components are adequately mixed, spread a thin film on white paper and examine closely for streaks of base or accelerator. Temperature of the adhesive should not exceed 80°F (27°C) during mixing.

Work Life

After mixing, the mixture remains workable for a time before it becomes too viscous to properly wet the surface to which it is applied. The work life and rate of cure are both greatly affected by temperature and to some extent by humidity; curing faster as temperature and humidity are increased. The work life of a one-pound bath of the mixture is approximately 90 minutes providing the mixture is maintained at room temperature (73°F [23°C]) and stirred frequently to minimize localized temperature increases.

Equipment Suggestions

Application can be made with a spatula, trowel, or flow equipment. Suitable two-part mixing and metering equipment is available. Contact your 3M representative for assistance in selecting application equipment to suit your specific needs.

Cure Cycle

In general, the curing of 3M™ Scotch-Weld™ Structural Adhesive EC-1648 B/A to a thermoset condition is a time-temperature relationship. The only pressure requirement is that the parts must be held in contact and alignment during the cure cycle.

To effect a useful cure in a reasonable length of time, a minimum temperature of 40°F (4°C) is required.

The following cure cycle is suggested to obtain dense glue lines which give the strengths reported in the Test Results section.

Product Application ***(continued)***

Cleanup

Excess adhesive can be cleaned up, prior to curing, with Toluol* or Ketone* type solvents.

***Note:** When using solvents, extinguish all ignition sources and follow the manufacturer's precautions and directions for use.

Product Performance

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

1. Prepare overlap sheer bonds in the manner described above and allow to cure as follows:
   a. Apply 2 psi bonding pressure uniformly to the bond line using dead weights.
   b. Allow panels to cure undisturbed at a temperature of 75°F (24°C) for 24-48 hours.

   In addition to the standard room temperature cure, the following times, and temperature will give a minimum of 2000 psi tensile shear strength.

Cure Temperature	Time
40°F (4°C)	7 days
150°F (66°C)	25 minutes
250°F (121°C)	2 minutes
350°F (177°C)	30 seconds

Bond Line Thickness

Optimum Performance is obtained with a 2-5 mil bond line.

Etched Aluminum Overlap Shear Strength

Test Temperature	Test Results
-67°F (-55°C)	2000 psi
75°F (24°C)	2500 psi
165°F (73°C)	1200 psi
180°F (82°C)	1000 psi

Cure Cycle: 7 days @ 75°F (24°C), 2 psi.

Etched Aluminum Overlap Shear Strength After Environmental Aging

Environment	Time	Test Results 75°F (24°C)
JP-4 Fuel @ 140°F (60°C)	14 days	3806 psi
100% Relative Humidity @ 120°F (49°C)	14 days	3566 psi
Salt Spray @ 95°F (35°C)	14 days	3000 psi

Cure Cycle: 1 hour @ 130°F (54°C), 10 psi, plus 2 hours @ 150°F (66°C). No Pressure.

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Storage

Store product at 60-80°F (16-27°C) for maximum storage life. Higher temperatures reduce normal storage life. Rotate stock on a “first in - first out” basis.

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

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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ISO 9002

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

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