3M

Scotch-Weld™
Bonding Film
AF 131-2

Technical Data **June, 2002**

Introduction

3M™ Scotch-Weld™ Bonding Film AF 131-2 is designed for the bonding of honeycomb and metal to metal components where high strengths at 450°F (232°C) are required. Data developed on this product indicates it has high performance over the range of temperatures from -67°F (-55°C) to 450°F (232°C).

Product Description

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

Color:	Tan
Base:	Modified Epoxy
Form:	Flexible Scrim Supported Film
Normal Caliper:	10-12 mils
Weight:	.075 lbs./ft.^{2} ± .01 lbs./sq. ft.
Tack Range:	120-180°F (49-82°C)
Flow Range:	180-250°F (82-121°C)
Min. Cure Temp.:	350°F (177°C)
Min. Cure Time:	60-90 min.
Volatile Loss on Cure:	Less than 1.5% (350°F [177°C] 1 hour)

Product Application

The Product Performance data reported in the next section were developed using the following recommended procedures. Other conditions are under evaluation.

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 Skins

1. Vapor Degrease – Hang skins in condensing vapors of perchloroethylene for 5 minutes.
2. Alkaline Degrease – Immerse skins in 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 skins in either of the following solutions for 10 minutes at 150°F ± 5°F (66°C ± 2°C). **Caution:** Use adequate respiratory, eye and skin protection when using etch solutions.

Sodium Dichromate ($Na_2Cr_2O_72H_2O$)	4.1 - 4.9 oz./gallon
Sulfuric Acid, 66° Be	38.5 - 41.5 oz./gallon
2024T-3 aluminum (dissolved)	0.2 oz./gallon minimum
Tap Water as needed to balance	

4. Rinse face sheets in clear running water.
5. Air dry 15 minutes; force dry 10 minutes with parts at 150°F ± 5°F (66°C ± 2°C).

II. Adhesive Layup

Care should be taken to avoid contaminating adhesive and cleaned aluminum by any substance which will hinder wetting action of the adhesive.

A. Film Application

1. Cut portion of film to be used from roll with protective liners in place.
2. Remove liner from one side of the film.
3. Place film on metal using a separating liner as a protective cover.
4. Roll film into position with a rubber roller, insuring that no air is trapped between film and panel.
5. Remove second protective liner.
6. Assemble parts and cure. Tack if necessary at 120-180°F (49-82°C).

Suggested Preparation Procedure *(continued)*

III. Cure Cycle

A. General

The tack, flow and cure initiation temperature for 3M™ Scotch-Weld™ Bonding Film AF 131-2 is a time-temperature relationship and depends upon the rate of heat input.

Normally, Scotch-Weld AF 131-2 will have the following properties:

Tack Temperature	120-180°F (49-82°C)
Flow Temperature	180-300°F (82-149°C)
Cure Initiation Temperature	300-350°F (149-177°C)

A minimum cure temperature of 350°F (177°C) is recommended to effect a cure in a reasonable length of time. (Approximately 60 minutes). A cure of 90 minutes at 350°F (177°C) and 50 psi pressure is suggested where maximum results are desired.

B. Cure Cycle (Autoclave or Platen Press)

The following cure cycle is recommended to obtain dense glue lines which give the strengths reported in the Product Performance section.

	Cure Cycle
1. Bonding Pressure: Apply before reaching a bond line temperature of 150°F (66°C) and maintain throughout press cure cycle.	50 psi
2. Bond line temperature rise rate.	3°F/minute
3. Cure.	90 min. @ 350°F (177°C)
4. Temperature at which pressure is released.	200°F (93°C) or below

Product Performance

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

The following product performance data has been obtained in the 3M Laboratory under the conditions specified. General application methods and bonding procedure are described later. All data reported in this section was developed under a cure cycle using 50 psi bonding pressure applied by a platen press, a 3°F/minute bond time temperature rise from 80°F to 350°F (27°C to 177°C) with 90 minutes at 350°F (177°C).

I. Aluminum to Aluminum Overlap Bonds

The following data shows typical values obtained with Scotch-Weld AF 131-2 on aluminum overlap panels. Overlap bonds consist of 1/2" overlap unprimed 0.063" 2024T-3 bare aluminum 4" x 7" panels, with one layer of Scotch-Weld AF 131-2 film adhesive. Tests were conducted per MMM-A-132 methods.

Test	Test Temperature	3-7°F/Min. Rise Rate Cure Cycle Average
Overlap Shear (PSI)	-67°F (-55°C) RT 350°F (177°C)	2000 psi 2300 psi 3000 psi

Scotch-Weld™
Bonding Film
AF 131-2

Storage Stability

Storage at 0 ± 5°F is recommended for 3M™ Scotch-Weld™ Bonding Film AF 131-2 to obtain maximum storage life.

CAUTION: Scotch-Weld AF 131-2 should be permitted to thoroughly warm to room temperature before being used in order to prevent moisture condensation.

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.

Important Notice

3M MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user's method of application. Please remember that many factors can affect the use and performance of a 3M Engineered Adhesives Division product in a particular application. The materials to be bonded with the product, the surface preparation of those materials, the product selected for use, the conditions in which the product is used, and the time and environmental conditions in which the product is expected to perform are among the many factors that can affect the use and performance of a 3M product. Given the variety of factors that can affect the use and performance of a 3M product, some of which are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for the user's method of application.

Limitation of Remedies and Liability

If the 3M product is proved to be defective, THE EXCLUSIVE REMEDY, AT 3M'S OPTION, SHALL BE TO REFUND THE PURCHASE PRICE OF OR TO REPAIR OR REPLACE THE DEFECTIVE 3M PRODUCT. 3M shall not otherwise be liable for loss or damages, whether direct, indirect, special, incidental, or consequential, regardless of the legal theory asserted, including, but not limited to, contract, negligence, warranty, or strict liability.

ISO 9002

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

3M

Aerospace Department
Engineered Adhesives Division
3M Center, Building 220-8E-05
St. Paul, MN 55144-1000
www.3M.com/aerospace

Recycled Paper
40% pre-consumer
10% post-consumer

Printed in U.S.A.
 78-6900-1324-4 (6/02)