



# Scotch-Weld™

## 9323-2 B/A Structural Adhesive

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### Product Data Sheet

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Updated : March 1996  
Supersedes : July 1995

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#### Product Description

9323-2 B/A is an epoxy based two part adhesive. It is designed for use where toughness and high strength are required.

9323-2 B/A offers the following advantages:

Cures at room temperature of 20-25°C (cure rate may be accelerated by the application of mild heat).

Graphite black in colour.

Convenient mix ratio.

Mixed adhesive is non-flow for ease of application.

Has excellent lap shear and peel strength at room and elevated temperatures.

High impact resistance.

High environmental resistance.

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#### Physical Properties

Not for specification purposes

|                                       | BASE (XA 9320)  | HARDENER (XA 9321) |
|---------------------------------------|---|--------------------|
| <b>Base</b>                           | Toughened Epoxy   | Modified Amine     |
| <b>Specific Gravity</b>               | 1.03  | 1.03               |
| <b>Mix Ratio</b><br>(Weight & Volume) | 100   | 50                 |
| <b>Colour</b>                         | Black   | Off-White          |
| <b>Work Life at 23 +/- 1°C</b>        | Approximately 180 min for 45 g.   |                    |
| <b>Shelf Life</b>                     | 6 months from date of despatch by 3M when stored in the original carton at 21°C (70°F) & 50 % Relative Humidity |                    |

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#### Performance Characteristics

Not for specification purposes

The data for the following Performance Characteristics has been obtained in the 3M laboratory under the conditions specified.

General application methods and bonding procedures are described later.

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**Overlap Shear Strength:** Overlap shear specimens were made according to A.E.C.M.A test method EN 2243-1 using 1.6 mm thick 2024 T-3 clad aluminium

with the surface prepared by the optimised FPL etch method.

Testing was done at jaw separation rate of 2.5mm/min.

The glue line thickness is controlled by adding 1% by weight of glass beads to the mixed adhesive (150 micrometers).

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**Performance  
Characteristics (Cont...)**  
Not for specification purposes

**Cure Cycles:**  
The following Cure Cycles were evaluated.

**Cycle 1:**  
7 days at 23 +/- 2°C under 100 kPa during first 24 hours.

**Cycle 2:**  
24 hours at 23 +/- 2°C under 100 kPa + 60 min at 80°C + 2°C.

**Cycle 3:**  
60 minutes at 65 +/- 3°C.

| BOND STRENGTHS ACHIEVED AFTER THE FOLLOWING CURE CYCLES |                     |                     |                     |
|---|---------------------|---------------------|---------------------|
| Test Conditions   | Cure Cycle 1<br>MPa | Cure Cycle 2<br>MPa | Cure Cycle 3<br>MPa |
| -55 +/- 2°C   | 23.7                | 31.6                | 27.0                |
| 23 +/- 2°C  | 30.2                | 28.7                | 31.5                |
| 80 +/- 2°C  | 11.9                | 12.7                | 13.7                |
| 120 +/- 2°C   | 2.8                 | 3.2                 | 3.8                 |
| 150 +/- 2°C   | 1.9                 | 1.7                 | Not Tested          |

**Metal to metal Floating  
Roller Peel Strength:**  
When tested on optimised FPL etched 2420 T-3 clad aluminium in accordance

with A.E.C.M.A. test method EN 2243-2, and T-Peel specimens according to ASTM-D 1876-72, Scotch-Weld adhesive 9323-2 B/A gave the following average values.

All values in N/25mm.

Glue line thickness is controlled by adding 1% be weight of glass beads to the mixed adhesive (0.15 to 0.22mm).

| Test Conditions                            | 23 +/- 2°C  |             |             | 80 +/- 2°C  |             |             |
|--|-------------|-------------|-------------|-------------|-------------|-------------|
|  | 1<br>N/25mm | 2<br>N/25mm | 3<br>N/25mm | 1<br>N/25mm | 2<br>N/25mm | 3<br>N/25mm |
| ROLLER PEEL<br>(EN 2243-2)                 |             |             |             |             |             |             |
| - Immediate assembly<br>- 90 min open time | 231<br>213  | 183<br>168  | 127<br>-    | 143<br>138  | 95<br>102   | 123<br>-    |
| T-PEEL<br>(ASTM-D 1876-72)                 |             |             |             |             |             |             |
| - Immediate assembly<br>- 90 min open time | 107<br>105  | 88<br>111   | 95<br>114   | 76<br>60    | 37<br>47    | 74<br>56    |

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**Performance Characteristics (Cont...)**  
Not for specification purposes

**Environmental Properties:**  
Typical results obtained on etched 1.6mm thick 2024 T-3 clad aluminium. Overlap shear specimens were made according to A.E.C.M.A. test method EN 2243-1.

Surface preparation was by optimised FPL etch method.  
Testing after ageing was done at 23 +/- 2°C at jaw separation rate of 2.5mm/min.

Samples were allowed to cure 7 days at 23 + 2°C prior to immersion in test environments.

All specimens show 100% cohesive failure in the adhesive layer.

| CONDITIONS                        | CURE 1     | CURE 2     |
|-----------------------------------|------------|------------|
| Control at 23 +/- 2°C             | 30.2       | 28.7       |
| DI water at 23°C                  | 27.4       | 27.2       |
| 80°C dry heat                     | 28.8       | 27.5       |
| 120°C dry heat                    | 32.8       | 28.3       |
| Skydrol <sup>e</sup> 500B at 23°C | 30.6       | 28.8       |
| JP4 at 23°C                       | 31.1       | 30.1       |
| Hydraulic oil at 23°C             | 32.1       | 30.2       |
| Engine oil at 23°C                | 30.8       | 30.2       |
| 5% salt spray at 33°C             | Under Test | Under Test |
| 50°C, 95% R.H.                    | Under Test | Under Test |
| 70°C, 95% R.H.                    | 21.7       | 21.4       |

**Impact Resistance:**  
The following results show typical data obtained with bonds made and tested using an Izod pendulum impact device according to AFNOR NF 76115 test method.

Results are expressed into kJ/m<sup>2</sup>:

Cure 1 : 22.6

Cure 2 : 25.3

**Rate of Cure - Strength Build-up:**  
The rate of strength build up is determined by pulling at the individual specimens (etched 2024 T-3 clad aluminium coupons)

left at 23 +/- 2°C. Each reported point is an average of 3 specimens.

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|                           |  |  |   |
|---------------------------|--|--|---|
| <b>Storage Conditions</b> | Store the product at 23°C or lower for maximum storage life. Rotate stock on a "first in-first out" basis. | Upon request, your 3M Specialty Tapes & Adhesives Sales Representative will be | pleased to advise the anticipated shelf life of this product under the applicable storage conditions. |
|---------------------------|--|--|---|

|                           |  |  |  |
|---------------------------|--|--|--|
| <b>Directions for Use</b> | <p><b>Product Application:</b></p> <p>Proper adhesive application is as important as proper bond design and adhesive choice to obtain maximum joint properties.</p> <p>Improper adhesive application techniques can result in partial or complete failure of an assembly.</p> <p>9323-2 B/A gives excellent properties under many application conditions. The product performance data, reported in the previous section, was developed using the following recommended procedures. Variations from these recommended procedures should be fully evaluated to ensure bond properties are sufficient to meet the requirements of a particular assembly.</p> | <p><b>Surface Preparation:</b></p> <p>A thoroughly clean, 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. Surface preparation techniques should be fully evaluated with the adhesive if resistance to specific environments is required.</p> <p><b>Recommended cleaning procedures for aluminium:</b></p> <p><b>Alkaline degrease</b> - Oakite 164 water solution (10%) at 85 +/- 5°C for 10-20 minutes. Rinse immediately and thoroughly in cold running water.</p> <p><b>Acid etch</b> - place panels in the following solution for 10 minutes at 65 +/- 3°C.</p> | <p><b>Optimised FPL etch (to make 1 litre):</b><br/><b>Concentrated sulphuric acid:</b> 332.0g.<br/><b>Sodium dichromate:</b> 44.8g<br/><b>Distilled Water:</b> Adjust to 1 litre.<br/><b>2024 T-3 aluminium grease free/drill chips (*):</b> 1.5g</p> <p><b>Caution:</b> Use adequate ventilation and skin protection when using etch solutions.</p> <p>(*): Allow aluminium drill chips to dissolve before using the etch.</p> <p><b>Rinse :</b> Rinse panels in clear deionised running water.<br/><b>Dry :</b> Air dry 15 minutes; force dry 10 minutes at 65 +/- 5°C.</p> <p>It is advisable to prime or bond the freshly cleaned surfaces within four hours after surface preparation.</p> |
|---------------------------|--|--|--|

### Mixing the Adhesive

Carefully read the caution statements that apply to this product.

Be sure to thoroughly mix the adhesive until it attains a uniform colour. Thorough mixing is important in achieving the optimum properties of this material.

| Mixing Ratio     | By Weight | By Volume |
|------------------|-----------|-----------|
| Parts Base B     | 100       | 100       |
| Parts Hardener A | 50        | 50        |

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### Work Life

The work life of mixed 9323-2 B/A is approximately 180 minutes in a mass of 45 grams at an ambient temperature of 23°C. The work life of the mixed adhesive will be lengthened by reducing the temperature or the amount of adhesive and will be shortened by higher temperatures or larger amounts of adhesive.

**Example:**  
45g mixed material : work life 180 minutes.

90g mixed material : work life 150 minutes.

**Caution:** Heat is generated during cure.

### Spreading:

The mixed adhesive may be applied by means of a spatula, notched trowel or by suitable extrusion equipment.

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### Health & Safety Information

**Precautions:**  
Harmful if swallowed. Risk of serious damage to eyes. May cause sensitisation by skin contact. Avoid contact with skin and eyes. Wear suitable gloves and eye/face protection.

### First Aid:

**Eye Contact:** Rinse immediately with plenty of water and seek medical advice.

**Skin Contact:** Wash with soap and water.

For further Health & Safety information, please contact our Toxicology Department on Bracknell (0344) 858000.

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Values presented have been determined by standard test methods and are average values not to be used for specification purposes. Our recommendations on the use of our products are based on tests believed to be reliable but we would ask that you conduct your own tests to determine their suitability for your applications. This is because 3M cannot accept any responsibility or liability direct or consequential for loss or damage caused as a result of our recommendations.



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