

## 3M™ Scotch-Weld™ EC-9323 B/A

### Two Part Structural Adhesive

#### Product Description

3M™ Scotch-Weld™ Structural Epoxy Adhesive EC-9323 B/A is a two component epoxy paste adhesive which cures at room temperature or with mild heat to form a tough, impact resistant structural bond. It has an excellent adhesion to a wide variety of substrates such as metals, glass, ceramics and plastics, incl. GFRP and CFRP. Once cured it provides extremely high shear and peel strength over a wide temperature range, with outstanding resistance to harsh environments and chemicals commonly encountered in aerospace applications.

#### Key Features

- Toughened system providing extremely high shear and peel strength
- Wide service temperature range
- Outstanding environmental resistance
- Full room temperature processing



#### Product Characterization

The following technical information and data should be considered representative or typical only and should not be used for specification purpose

| General Properties                                | Part B                       | Part A                   |
|---------------------------------------------------|------------------------------|--------------------------|
| Colour                                            | Off-white                    | Red-orange               |
| Base                                              | Modified epoxy               | Modified amine           |
| Consistency                                       | Thixotropic paste            | Slight gel               |
| Density                                           | 1.18 g / cm <sup>3</sup>     | 1.06 g / cm <sup>3</sup> |
| Solids                                            | 100 %                        | 100 %                    |
| Viscosity <sup>(a)</sup>                          | 700 Pas                      | 18 Pas                   |
| Mix ratio by weight (by volume)                   | 100 : 27 wt. (100 : 30 vol.) |                          |
| Work life <sup>(b)</sup> / Open Time at 23 ± 2 °C | 150 minutes / 20 minutes     |                          |
| Strength build-up at 23 ± 2 °C                    |                              |                          |
| Handling strength <sup>(c)</sup>                  | 4-5 hours                    |                          |
| Full cure cycle                                   | 14 days at room temperature  |                          |
| Packaging                                         | Cans and pails               |                          |

<sup>(a)</sup> Brookfield RVF Spindle 7, 2 rpm

<sup>(b)</sup> 50 g of mixed adhesive

<sup>(c)</sup> Time to reach 1 MPa Overlap Shear Strength

## Product Performance

The following data show typical values obtained with Scotch-Weld™ EC-9323 B/A on unprimed, sulfochromic etched, 2024 T3 aluminium. The samples have been cured for 15 days at room temperature, if not stated otherwise. To control the bond line thickness, approximately 1 wt. % of glass beads, 90 – 150 µm diameter were added to the adhesive.

| Mechanical Properties                             |                               | Test Temperature | Cured for<br>15 days at 23 °C | Cured for<br>2 hours at 65 °C |
|---------------------------------------------------|-------------------------------|------------------|-------------------------------|-------------------------------|
| <b>Overlap Shear Strength</b><br>EN 2243-1        |                               | -55 °C           | 38 MPa                        | 42 MPa                        |
|                                                   |                               | 23 °C            | 36 MPa                        | 40 MPa                        |
|                                                   |                               | 80 °C            | 22 MPa                        | 22 MPa                        |
|                                                   |                               | 120 °C           | 4 MPa                         | 4 MPa                         |
|                                                   |                               | 150 °C           | 2 MPa                         | -                             |
| <b>Overlap Shear Strength</b><br>EN 2243-1        | Stainless steel               | 23 °C            | -                             | 27 MPa                        |
|                                                   | CFRP, GFRP epoxy matrix resin | 23 °C            | -                             | 28 MPa <sup>(d)</sup>         |
|                                                   | PMMA                          | 23 °C            | -                             | 3 MPa <sup>(d)</sup>          |
| <b>Floating Roller Peel Strength</b><br>EN 2243-2 |                               | -55 °C           | 120 N / 25 mm                 | 90 N / 25 mm                  |
|                                                   |                               | 23 °C            | 170 N / 25 mm                 | 190 N / 25 mm                 |
|                                                   |                               | 80 °C            | 145 N / 25 mm                 | 145 N / 25 mm                 |
| <b>Impact Resistance</b> ANFOR NF 76-115          |                               | 23 °C            | 17,4 kJ / m²                  | 32,2 kJ / m²                  |

<sup>(d)</sup> Substrate Failure

## Environmental Ageing

The following data show typical values obtained with Scotch-Weld™ EC-9323 B/A after 750 hours exposure to different media and environments to determine the aging resistance. The samples have been cured for 15 days at room temperature.

| Mechanical Properties                      | Environment                               | Test Temperature | Results |
|--------------------------------------------|-------------------------------------------|------------------|---------|
| <b>Overlap Shear Strength</b><br>EN 2243-1 | Demineralized water at 23 ± 2 °C          | 23 °C            | 34 MPa  |
|                                            | Gasoline super at 23 ± 2 °C               | 23 °C            | 36 MPa  |
|                                            | Engine oil (20W40) 23 ± 2 °C              | 23 °C            | 36 MPa  |
|                                            | Hydraulic fluid skydrol 500B at 23 ± 2 °C | 23 °C            | 37 MPa  |
|                                            | JP4 fluid at 23 ± 2 °C                    | 23 °C            | 36 MPa  |
|                                            | 5 % Salt spray at 23 ± 2 °C               | 23 °C            | 34 MPa  |
|                                            | Hot / Wet 70 °C, ≥ 95% R.H.               | 23 °C            | 33 MPa  |
|                                            | Dry heat at 120 ± 2 °C                    | 23 °C            | 35 MPa  |

## 3M™ Scotch-Weld™ Structural Epoxy Adhesive EC-9323-150 B/A

Scotch-Weld™ EC-9323-150 B/A is a product modification of Scotch-Weld™ EC-9323 B/A. There are no significant differences in terms of performance. It contains 1 wt % of glass beads 90 – 150 µm diameter for bond line thickness control. Slight differences can be observed in density and viscosity.

# Handling, Application, Storage

## Precautionary Information

Refer to product label and Material Safety Data Sheet (MSDS) for health and safety information before using this product. For MSDS visit our website [www.3M.com/msds](http://www.3M.com/msds).

## Instructions for use

While this information is provided as general application guideline based upon typical conditions, it is recognized that no two applications are identical due to, among other things, differing assemblies, methods 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.

| Process step         | Instruction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Surface preparation  | <p>The strength and durability of a bonded joint are dependent on proper treatment of the surface to be bonded. An acclimated, 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.</p> <p>At the very least, joint surfaces should be cleaned with a good proprietary degreasing agent and mechanically abraded, e.g. with 3M Scotch-Brite™ 7447. Abrading should be followed by a second degreasing treatment, e.g. with 3M 08984 Adhesive Cleaner.</p> <p>Optimum processing temperature for substrates and adhesive is around room temperature of 23 °C.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Application          | <p>This product consists of two parts. Combine Part B and Part A in a separate container just prior to application in the proportions specified. <b>Note:</b> Mix ratio deviations above +/- 5 % have significant influence on material performance. Mix both components thoroughly until a uniform colour is obtained. <b>Important:</b> Be careful when mixing quantities larger than 100 grams, because exothermic reaction may occur. Apply adhesive to parts to be bonded before the work life expires, e.g. by spatula. <b>Note:</b> Work life depends to some extent on mixed quantity and the shape of the container. Use of a shallow container will minimize the quantity impact. In order to obtain optimum mechanical performance, the joint components should be assembled and clamped as soon as the adhesive has been applied and before end of the open time. A fixation of the joint and an even contact pressure throughout the joint area during cure will ensure optimum performance. Maximum shear strength is obtained with 0.10 – 0.20 mm bond line thickness. Close the containers after use to protect the material against humidity.</p> |
| Curing               | <p>Once mixed, Scotch-Weld™ EC-9323 B/A will gel in 3 hours, build up handling strength in 4-5 hours and fully cure within 14 days at room temperature. <b>Note:</b> Lower temperature will slow down the reaction times. Curing time can be accelerated by mild heat. Following times and temperatures will result in a full cure:</p> <ul style="list-style-type: none"><li>▪ 14 days at 23 ± 2 °C</li><li>▪ 2 hours at 65 ± 2 °C</li><li>▪ 15 minutes at 100 ± 2 °C</li></ul> <p><b>Note:</b> The curing temperature may have influence on the final product performance.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Cleaning             | <p>Excess uncured adhesive can be cleaned with ketone type solvents. After cure the adhesive can be removed mechanically. <b>Note:</b> When using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer's precautions and instructions for use.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Storage and Handling | <p>Store the product at room temperature. Shelf life is 12 months from date of shipment in the original unopened containers.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

**Important notice:** All statements, technical information and recommendations in this data sheet are based on tests 3M believes to be reliable, but the accuracy or completeness of those tests is not guaranteed. All technical data and information should be considered typical or representative only and should not be used for specification purposes. Given the variety of factors that 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 before use to determine the suitability of the 3M product for the intended use and method of application. All questions of liability relating to the 3M product are governed by the terms of the sale subject to, where applicable, the prevailing law.



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