



# Hysol® EA 9394.2

## Epoxy Paste Adhesive

Henkel Corporation  
Aerospace Group  
2850 Willow Pass Road  
P.O. Box 312  
Bay Point, CA 94565 USA  
**925.458.8000**  
Fax: 925.458.8030  
www.aerospace.henkel.com

### Description

Hysol EA 9394.2 is a fast curing two-part structural paste adhesive, which cures at room temperature. Its thixotropic nature makes it ideal for potting, filling and liquid shim applications.

### Features

Fast Set Time - 4 hours  
Good Gap Filling Capabilities  
>250°F/121°C Performance  
Potting Material  
Room Temperature Storage  
Thixotropic

### Uncured Adhesive Properties

|                                  | <u>Part A</u>         | <u>Part B</u>         | <u>Mixed</u>          |
|----------------------------------|-----------------------|-----------------------|-----------------------|
| Color                            | Gray                  | Black                 | Gray                  |
| Viscosity, 77°F                  | 3000-9500 Poise       | 50 - 120 Poise        | 1600 Poise            |
| Brookfield, HBT                  | Spdl 7 @ 20 rpm       | Spdl 2 @ 20 rpm       | Spdl 5 @ 20 rpm       |
| Viscosity, 25°C                  | 300-950 Pa·S          | 5-20 Pa·S             | 160 Pa·S              |
| Brookfield, HBT                  | Spdl 7 @ 2.09 rad/sec | Spdl 5 @ 1.05 rad/sec | Spdl 5 @ 2.09 rad/sec |
| Density (g/ml)                   | 1.45                  | 1.00                  | 1.36                  |
| Shelf Life from date of shipment |                       |                       |                       |
| @ <40°F/4°C                      | 1 year                | 1 year                |                       |
| @ <82°F/28°C                     | 1 year                | 1 year                |                       |

This material will normally be shipped at ambient conditions, which will not alter our standard warranty, provided that the material is placed into its intended storage upon receipt. Premium shipment is available upon request.

### Handling

**Mixing** - This product requires mixing two components together just prior to application to the parts to be bonded. Complete mixing is necessary. The temperature of the separate components prior to mixing is not critical, but should be close to room temperature (77°F/25°C).

Note: Volume measurement is not recommended for structural applications unless special precautions are taken to assure proper ratios.

| <u>Mix Ratio</u> | <u>Part A</u> | <u>Part B</u> |
|------------------|---------------|---------------|
| By Weight        | 100           | 27            |

**Pot Life** (100 gm mass) 20 - 30 minutes @ 77°F/25°C  
 Method - ASTM D 2471 in water bath.

**Application**

**Mixing** - Combine Part A and Part B in the correct ratio and mix thoroughly. THIS IS IMPORTANT! Heat buildup during or after mixing is normal. Do not mix quantities greater than 100 grams unless planning to use immediately. If more than needed is mixed, do not leave mass in container, as excess heat generated may cause a runaway exotherm. The runaway exotherm causes uncontrolled decomposition of the mixture. DECOMPOSITION PRODUCTS MAY PRODUCE TOXIC FUMES, RESULTING IN PERSONAL IRRITATION AND POSSIBLE INJURY. Mixing smaller quantities will minimize the heat buildup.

**Applying** - Bonding surfaces should be clean, dry and properly prepared. For optimum surface preparation consult the Hysol Surface Preparation Guide. The bonded parts should be held in contact until the adhesive is set. Handling strength for this adhesive will occur in 4 hours @ 77°F/25°C, after which the support tooling or pressure used during cure may be removed. Since full bond strength has not yet been attained, load application should be small at this time.

Note: Special precautions are recommended to minimize carbonate formation in large assemblies subject to extended open times in humid environments. A special memo is available upon request from Henkel providing users with suggestions for minimizing carbonate formation.

**Curing** - Hysol EA 9394.2 may be cured for 24 hours @ 77°F/25°C to achieve normal performance.

**Cleanup** - It is important to remove excess adhesive from the work area and application equipment before it hardens. Denatured alcohol and many common industrial solvents are suitable for removing uncured adhesive. Consult your supplier's information pertaining to the safe and proper use of solvents.

**Bond Strength Performance**

**Tensile Lap Shear Strength** - tested per ASTM D1002 after curing for 5 days @ 77°F/25°C under 25 psi / 172 kPa. Adherends are 2024-T3 Alclad aluminum treated with phosphoric acid anodized per ASTM D3933 and then coated with a state of the art corrosion inhibiting primer.

| <u>Test Temperature, °F/°C</u> | <u>Typical Results</u> |            |
|--------------------------------|------------------------|------------|
|                                | <u>psi</u>             | <u>MPa</u> |
| -67/-55                        | 2,700                  | 18.6       |
| 77/ 25                         | 4,910                  | 33.9       |
| 180/82                         | 3,140                  | 21.7       |
| 250/121                        | 1,640                  | 11.3       |

**Tensile Lap Shear Strength** - tested per ASTM D1002 after curing for 5 days @ 77°F/25°C under 25 psi / 172 kPa. Adherends are 2024-T3 Bare aluminum treated with phosphoric acid anodized per ASTM D3933.

**After Exposure to/Test Temperature**

|   | <u>Typical Results</u> |            |
|---|------------------------|------------|
|   | <u>psi</u>             | <u>MPa</u> |
| Room Temperature Control (No Exposure)      | 3,752                  | 25.9       |
| Salt Spray 30 Days at 95°F (35°C) & 5% NaCl | 3,048                  | 21.0       |
| Hot/Wet 30 Days at 158°F (70°C) & 95%RH     | 3,335                  | 23.0       |
| Jet Fuel (JP-4) 30 Days at 140°F (60°C)     | 3,659                  | 25.2       |

**Tensile Lap Shear Strength as a Function of Cure Time** - tested per ASTM D1002. Adherends are 2024-T3 bare aluminum treated with phosphoric acid anodized per ASTM D3933. Cure pressure 20 psi / 138 kPa.

| <u>Test Temperature, 77°F/25°C</u>         | <u>Typical Results</u> |            |
|--|------------------------|------------|
|  | <u>psi</u>             | <u>MPa</u> |
| <b>Cure Time</b>                           |                        |            |
| 5 hours @ 77°F/25°C                        | 1,920                  | 12.7       |
| 1 day @ 77°F/25°C                          | 4,190                  | 28.9       |
| 4 days @ 77°F/25°C                         | 4,432                  | 29.3       |
| 1 day @ 77°F/25°C plus 1 hour @ 180°F/82°C | 4,410                  | 27.9       |

**Peel Strength**

Floating Roller Peel Strength tested per ASTM D3167 after curing for 5 days @ 77°F/25°C under 25 psi / 172 kPa. Adherends are 2024-T3 Alclad aluminum peeling member 020" / 0.51 mm thick treated with phosphoric acid anodizing per ASTM D3933 and then coated with a state of the art corrosion inhibiting primer.

| <u>Test Temperature, °F/°C</u> | <u>Typical Results</u> |               |
|--------------------------------|------------------------|---------------|
|                                | <u>lb/in</u>           | <u>N/25mm</u> |
| 77/25                          | 20                     | 90            |

**Compression Strength Performance - Various Temperature Ranges Evaluated**

Adhesive Cure: 7 days at 75°F (24°C)

Specimen Dimensions: Cylindrical: 1" tall x 0.5" diameter (25.4mm x 12.7 diameter)

Compression strength was tested per ASTM D695, test rate 0.05"/minute (1.27mm/minute)

Specimen soak time was 15 minutes at cold and elevated test temperatures prior to testing

|                   | <u>Unit</u> | <u>-67°F</u><br><u>(-55°C)</u> | <u>75°F</u><br><u>(24°C)</u> | <u>110°F</u><br><u>(43°C)</u> | <u>120°F</u><br><u>(49°C)</u> | <u>140°F</u><br><u>(60°C)</u> | <u>160°F</u><br><u>(71°C)</u> | <u>225°F</u><br><u>(107°C)</u> |
|-------------------|-------------|--------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|
| Ultimate Strength | PSI         | 33,184                         | 11,329                       | 9,003                         | 8,682                         | 6,038                         | 5,277                         | 2,369                          |
|                   | KSI         | 33.1                           | 11.3                         | 9.0                           | 8.7                           | 6.0                           | 5.3                           | 2.4                            |
|                   | MPa         | 228.8                          | 78.1                         | 62.1                          | 59.9                          | 41.6                          | 36.4                          | 16.3                           |
| 2% Offset         | PSI         | 28,070                         | 10,814                       | 8,516                         | 8,125                         | 5,961                         | 5,031                         | 1,964                          |
|                   | KSI         | 28.1                           | 10.8                         | 8.5                           | 8.1                           | 6.0                           | 5.0                           | 1.9                            |
|                   | MPa         | 193.5                          | 74.6                         | 58.7                          | 56.0                          | 41.1                          | 34.7                          | 13.5                           |

**Service Temperature**

Service temperature is defined as that temperature at which this adhesive still retains 1000 psi/6.9 MPa using test method ASTM D1002 and is >250°F/121°C.

**Bulk Resin Properties**

|  |                |               |
|--|----------------|---------------|
| <b>Shore D Hardness, @ 77°F/25°C,</b>      | <b>4 hours</b> | <b>5 days</b> |
| Approx. 0.25 inch/6.35 mm thick            | 84             | 87            |
| ASTM D-2240 - Type D Durometer, Model 307L |                |               |

### Thermal Property

**Glass Transition Temperature ( $T_g$ )** - Rheometric Scientific DMTA IV - Single Cantilever,

Heat-up rate: 5°C/min., Frequency: 1 Hz, Strain: 0.1%.

Specimen Dimensions: 1" x 0.49" x 0.063" (25.4mm x 12.4mm x 1.6mm).

Cure: 5 days @ 77°F/25°C

|                  |       |      |
|------------------|-------|------|
| $T_g$ dry (DMTA) | 158°F | 70°C |
|------------------|-------|------|

|                  |       |      |
|------------------|-------|------|
| $T_g$ wet (DMTA) | 196°F | 91°C |
|------------------|-------|------|

\*Wet: 158°F/70°C & 85% RH until saturation. Moisture uptake was 3%.

\* The wet  $T_g$  is > than the dry  $T_g$  due to the post curing effect of the samples at 158°F (70°C) & 85% RH.

### Handling Precautions

Do not handle or use until the Material Safety Data Sheet has been read and understood.

For industrial use only.

### General:

As with most epoxy based systems, use this product with adequate ventilation. Do not get in eyes or on skin. Avoid breathing the vapors. Wash thoroughly with soap and water after handling. Empty containers retain product residue and vapors, so obey all precautions when handling empty containers.

### PART A

**WARNING!** As with most epoxy based systems, the uncured adhesive may cause eye and skin irritation or allergic dermatitis. Contains epoxy resins.

### PART B

**WARNING!** This material causes eye and skin burns. Vapors may be irritating to the respiratory tract.

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Users should review the Materials Safety Data Sheet (MSDS) and product label for the material to determine possible health hazards, appropriate engineering controls and precautions to be observed in using the material. Copies of the MSDS and label are available upon request.

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