



Technical Process Bulletin

LOCTITE EA 9359.3 AERO

Epoxy Paste Adhesive

(KNOWN AS Hysol EA 9359.3)

INTRODUCTION

LOCTITE EA 9359.3 AERO is two-component structural adhesive which exhibits high peel and high tensile lap shear strength. It contains 5 mil/0.13 mm glass beads for bondline thickness control. This adhesive has excellent resistance to water, salt spray and most organic fluids. A variety of substrates such as metals, thermoplastics and composites may be bonded using LOCTITE EA 9359.3 AERO. LOCTITE EA 9359.3 AERO is offered in a two to one cartridge with static mixer.

FEATURES

- Easy Mix
- Good Environmental Resistance
- Non Sag
- High Shear Strength
- Bondline Thickness Control
- High Peel Strength
- Available in 2:1 Dual Cartridge with Static Mixer

Uncured Properties

| | <u>Part A</u> | <u>Part B</u> | <u>Mixed</u> |
|-----------------------|--------------------|--------------------|--------------|
| Color | Yellow | Blue | Green |
| Viscosity @ 77°F | 2,000 Poise | 1,000 Poise | |
| Brookfield, HBT | Spdl 7 @ 20 rpm | Spdl 6 @ 20 rpm | |
| Viscosity @ 25°C | 200 Pa·S | 100 Pa·S | |
| Brookfield, HBT | Spdl 7 @ 2.1 rad/s | Spdl 6 @ 2.1 rad/s | |
| Density (g/ml) | 1.16 | 1.01 | 1.12 |
| Shelf life@ 77°F/25°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.

| <u>Mix Ratio</u> | <u>Part A</u> | <u>Part B</u> |
|------------------|---------------|---------------|
| By Weight | 100 | 44 |
| By Volume | 2 | 1 |

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



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Pot Life

100 gram mass 60 minutes @ 77°F/25°C

200 gram mass 50 minutes @ 77°F/25°C

450 gram mass 40 minutes @ 77°F/25°C

Method - ASTM D2471 in water bath

Peak Exotherm (450 gram mass) is >300°F/149°C @ 40 minutes.

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).

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 450 grams as dangerous heat buildup can occur causing uncontrolled decomposition of the mixed adhesive. TOXIC FUMES CAN OCCUR, RESULTING IN PERSONAL 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 LOCTITE Surface Preparation Guide. The bonded parts should be held in contact until the adhesive is set. Handling strength for this adhesive will occur in 24 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.

Curing - This adhesive may be cured for 5 to 7 days @ 77°F/25°C to achieve normal performance. Accelerated cures up to 200°F/93°C (for small masses only) may be used as an alternative. For example, 1 hour @ 180°F/82°C will give complete cure.

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**

Tensile lap shear strength tested per ASTM D1002 after curing for 7 days @ 77°F/25°C. Adherends are 2024-T3 AlClad aluminum, phosphoric acid anodized per ASTM D3933.

Typical Results

| <u>Test Temperature, °F/°C</u> | <u>psi</u> | <u>MPa</u> |
|--------------------------------|------------|------------|
| -67/-55 | 4,000 | 27.6 |
| 77/25 | 4,500 | 31.0 |
| 180/82 | 2,000 | 13.8 |
| 200/93 | 1,000 | 6.9 |



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Peel Strength

T-Peel strength tested per ASTM D1876 after curing for 7 days @ 77°F/25°C. Adherends are 2024-T3 AlClad aluminum, phosphoric acid anodized per ASTM D3933.

| <u>Test Temperature, °F/°C</u> | Typical Results | |
|--------------------------------|------------------------|----------------|
| | <u>Lb/in</u> | <u>N/25 mm</u> |
| 77/25 | 60 | 267 |

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 approximately 200°F/93°C.

Bulk Resin Properties

Tensile Properties - tested using 0.125 inch/3.18 mm castings per ASTM D638. Adhesive cure 5 days @ 77°F/25°C and 1 hour @ 200°F/93°C.

| | | |
|---|---------|----------|
| Tensile Modulus @ 77°F/25°C | 310 ksi | 2136 MPa |
| Elongation at Break @ 77°F/25°C | 7.7% | |
| Shear Modulus, dry @ 77°F/25°C (by RDS) | 149 ksi | 1027 MPa |
| Shear Modulus, wet @ 77°F/25°C (by RDS) | 89 ksi | 613 MPa |

| | <u>Dry</u> | <u>Wet</u> ¹ |
|---|------------|-------------------------|
| T _g (Tan Delta by DMTA) @ 77°F/25°C cure | 134°F/51°C | 150°F/66°C |
| T _g (Tan Delta by DMTA) @ 200°F/93°C cure | 185°F/85°C | 149°F/65°C |
| ¹ Wet exposure: 30 days @ 160°F/71°C, 95% RH | | |

Thermal Conductivity - Tested per ASTM E1461

| | |
|--------------------|------|
| Specific Heat, J/g | 0.93 |
| Conductivity, W/mK | 0.24 |

Compressive Properties - tested using 0.5 inch x 1 inch (12.7 x 25.4 mm) right cylinders @ 77°F/25°C per ASTM D695.

| | | |
|---|------------|----------|
| Compressive Strength cured @ 77°F/25°C | 7,700 psi | 53.0 MPa |
| Compressive Strength cured @ 200°F/93°C | 21,000 psi | 145 MPa |

Handling Precautions

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

DISPOSAL INFORMATION

Dispose of spent remover and paint residue per local, state and regional regulations. Refer to HENKEL TECHNOLOGIES MATERIAL SAFETY DATA SHEET for additional disposal information.



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PRECAUTIONARY INFORMATION

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

CAUTION! This material may cause eye and skin irritation or allergic dermatitis. It contains epoxy resins.

PART B

WARNING! This material causes eye and skin irritation or allergic dermatitis. It contains amines.

Before using this product refer to container label and HENKEL TECHNOLOGIES MATERIAL SAFETY DATA SHEET for additional precautionary, handling and first aid information.

Note

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