



Technical Process Bulletin

LOCTITE EA 9394.2 AERO

Epoxy Paste Adhesive

(KNOWN AS Hysol EA 9394.2)

INTRODUCTION

LOCTITE EA 9394.2 AERO 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 Brookfield, HBT	3000-9500 Poise Spdl 7 @ 20 rpm	50 - 120 Poise Spdl 2 @ 20 rpm	1600 Poise Spdl 5 @ 20 rpm
Viscosity, 25°C Brookfield, HBT	300-950 Pa·S Spdl 7 @ 2.09 rad/sec	5-20 Pa·S Spdl 5 @ 1.05 rad/sec	160 Pa·S Spdl 5 @ 2.09 rad/sec
Density (g/ml)	1.45	1.00	1.36
Shelf Life			
@ <40°F/4°C	1 year	1 year	
@ <82°F/28°C	1 year	1 year	

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).

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

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 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 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 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 - LOCTITE EA 9394.2 AERO 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>	Typical Results	
	<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



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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.

Test Temperature, 77°F/25°C <u>Specimen Conditioning</u>	Typical Results	
	psi	MPa
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.

Test Temperature, 77°F/25°C <u>Cure Time</u>	Typical Results	
	psi	MPa
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 inch/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>	Typical Results	
	<u>lb/in</u>	<u>N/25mm</u>
77/25	20	90

Compression Strength Performance - Various Temperature Ranges Evaluated

- Adhesive Cure: 7 days at 77°F (25°C)
- Specimen Dimensions, cylindrical 1 inch/25.4 mm tall x 0.5 inch/12.7 mm diameter
- Compression strength was tested per ASTM D695, test rate 0.05 inch/min. (1.27 mm/min.)
- Specimen soak time was 15 minutes at cold and elevated test temperatures prior to testing

	Unit	-67°F (-55°C)	75°F (24°C)	110°F (43°C)	120°F (49°C)	140°F (60°C)	160°F (71°C)	225°F (107°C)
Ultimate Strength	PSI	33,184	11,329	9,003	8,682	6,038	5,277	2,369
	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
	MPa	193.5	74.6	58.7	56.0	41.1	34.7	13.5



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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

Shore D Hardness @ 77°F/25°C,

Approx. 0.25 inch/6.35 mm thick

ASTM D-2240 - Type D Durometer, Model 307L

4 hours

5 days

84

87

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
 - Wet: 158°F/70°C & 85% RH until saturation. Moisture uptake was 3%.
 - The T_g Wet is > than the T_g Dry due to the post curing effect of the samples at 158°F/70°C & 85% RH.
- | | | |
|-------------------------|-------|------|
| T _g Dry (E') | 158°F | 70°C |
| T _g Wet (E') | 196°F | 91°C |

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.

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.



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Henkel Corporation Aerospace | 2850 Willow Pass Road | Bay Point, CA 94565
PHONE: +1.925.458.8000 | FAX: +1.925.458.8030 | www.henkel.com/aerospace

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