Hysol® EA 9321

Epoxy Paste Adhesive

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Description

Hysol EA 9321 is a two-component thixotropic paste adhesive, which exhibits toughness and retains strength at elevated temperatures. This product cures at room temperature and yields durable bonds over a wide temperature range.

Features

Two Component System
Tough Durable Bonds
Room Temperature Cure
Good Elevated Temperature Strength

Uncured Adhesive Properties

	Part A	Part B	Mixed
Color	Gray	Off White	Gray
Viscosity @ 77°F	3,000 - 6,000 Poise	350 - 1,000 Poise	
Brookfield, HBT	Spdl 7 @ 20 rpm	Spdl 5 @ 20 rpm	
Viscosity @ 25°C	300 - 600 Pa·S	35 - 100 Pa·S	
Brookfield, HBT	Spdl 7 @ 2.1 rad/s	Spdl 5 @ 2.1 rad/s	
Density (g/ml)	1.24	1.22	1.23
Shelf life			
@ <40°F/4°C	1 year	1 year	
@ <77°F/25°C	3 months	1 year	
@ <90°F/32°C	1 month	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).

Mix Ratio	Part A	Part B
By Weight	100	50

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

Pot Life **(450 gm mass)** **40 minutes**
Method - ASTM D2471 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 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 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 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 as shown below.

Adherends are 2024-T3 clad aluminum treated with sodium dichromate - sulfuric acid etch per ASTM D2651-90.

	Typical Results			
	Cured 7 days @ 77°F/25°C		**Cured 1 hr @ 180°F/82°C**	
Test Temperature (F/°C)	**psi**	**MPa**	**psi**	**MPa**
-67/-55	3,000	20.7	3,800	26.2
77/25	4,000	27.6	4,000	27.6
180/82	1,700	11.7	3,500	24.1
250/121	1,000	6.9	1,500	10.3
300/149	750	5.2	900	6.2
350/177	600	4.1	600	4.1
400/204	500	3.4	500	3.4

After Exposure to:*	**Typical Results**	
	psi	**MPa**
Control	4,200	29.0
120°F/49°C - 100% RH - 30 days	3,700	25.5
Salt Spray - 105°F/40°C - 30 days	3,400	23.4

*All exposures tested @ 77°F/25°C

Specifications
The above values are typical results under ideal conditions. To establish certification values, please refer to the Loctite Aerospace Specification LAS-AS9109 which defines quality control test values, methods and

procedures. For a copy of the Loctite Aerospace Specification, contact Loctite's Literature Desk at (925) 458-8000.

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 250°F/121°C.

Loctite QC Acceptance Testing
This data sheet provides users with typical properties obtained from this adhesive. These values are not meant to be used to develop aerospace QC acceptance testing. Users interested in establishing values and tests for routine QC acceptance should request our internal specification (DAS), which provides detail test methods and values used to certify this adhesive.

Bulk Resin Properties

Tensile Properties **-** tested using 0.125 inch/3.18 mm castings per ASTM D638.

Tensile Strength @ 77°F/25°C	7,100 psi	49.0 MPa
Tensile Modulus @ 77°F/25°C	420 ksi	2.90 GPa
Elongation at Break, @ 77°F/25°C	6%	
Shore D Hardness @ 77°F/25°C	84	
Tg dry	230°F	110°C
Tg wet	190°F	88°C
Shear Modulus	225 ksi	1.55 GPa
Poisson's Ratio	0.36	

Tensile Properties tested using 0.5 inch/12.7 mm castings per ASTM D695.

Compressive Strength @ 77°F/25°C - Yield	9,280 psi	64.00 MPa
Compressive Strength @ 77°F/25°C - Ultimate	16,880 psi	116.42 MPa

Electrical Properties - tested per ASTM D149, D150.

Dielectric Constant, 1 KHz, 77°F/25°C	4.81
Dissipation Factor, 1 KHz, 77°F/25°C	0.018

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

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.

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