Hysol® EA 9309.3NA

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 9309.3NA is a toughened two-part paste adhesive. It contains 5 mil/0.13 mm glass beads for bondline thickness control. Hysol EA 9309.3NA bonds metal skins and honeycomb core to yield tough permanently flexible joints resistant to humidity, water and most common fluids. Its outstanding feature is high shear and peel strength to aluminum.

Features

High Shear Strength
High Peel Strength
Bondline Thickness Control
Good Environmental Resistance

Uncured Adhesive Properties

	Part A	**Part B**
Color	Pink	Blue
Viscosity @ 77°F	3,000 Poise	0.2 Poise
Brookfield, HBT	Spdl 7 @ 20 rpm	Spdl 1 @ 60 rpm (LVF)
Density	1.15	1.0
Viscosity @ 25°C	300 Pa·S	0.02 Pa·S
Brookfield, HBT	Spdl 7 @ 2.1 rad/s	Spdl 1 @ 6.3 rad/s
Warranty Life @ 77°F	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).

Mix Ratio	Part A	Part B
By Weight	100	22

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

Pot Life (450 gm mass) 35 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 12 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 3 to 5 days @ 77°F/25°C or 1 hour @ 180°F/82°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

Tensile lap shear strength tested per ASTM D1002 after curing for 5 days @ 77°F/25°C. Adherends are 2024-T3 alclad aluminum treated with phosphoric acid anodizing per ASTM D3933.

	Typical Results	
Test Temperature, °F/°C	**psi**	**MPa**
-67/-55	4,000	27.6
77/25	4,200	28.9
180/82	1,000	6.9

After Exposure to the Following conditions*:

	Typical Results	
	psi	**MPa**
Control, 77°F/25°C	4,800	33.1
77°F Water - 30 days	4,700	32.4
120°F/49°C - 98% RH - 30 days	5,100	35.2
Hydraulic Oil - 7 days	4,600	31.7
JP-4 Fuel - 7 days	4,700	32.3

	psi	Mpa
Salt Spray - 105°F/41°C - 30 days	5,000	32.4
Anti-icing Fluid - 7 days	4,500	31.3
Hydrocarbon III - 7 days	4,300	29.6
Skydrol 500 - 7 days	4,600	31.7
Creep Deflection at 77°F after 192 hrs @ 1600 psi load (11.0 Mpa)	0.00056 in	0.0142 mm

*Test temperature on all exposure tests is 77°F/25°C

Peel Strength

T-Peel strength tested per ASTM D1876 after curing for 3 to5 days @ 77°F/25°C. Adherends are 2024-T3 alclad aluminum treated with phosphoric acid anodizing per ASTM D3933.

	Typical Results	
Test Temperature, °F/°C	**Lb/in**	**N/25mm**
77/25	35	156

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 180°F/82°C.

Dexter 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 the Dexter Aerospace 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	4,500 psi	31.0 MPa
Tensile Modulus @ 77°F/25°C	324 ksi	2,232 MPa
Elongation at Break, % @ 77°F/25°C	10%	
Shore D Hardness @ 77°F/25°C	80	
Shear Modulus	124 ksi	854 MPa
Poisson's Ratio	0.42	

Glass Transition Temperature - cure 7 days @ 77°F

Tg dry (77°F/25°C) (Tan delta by DMTA)	138.2°F	59°C
Tg wet (Tan delta by DMTA)	127.4°F	53°C

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

Compressive Strength @ 77°F/25°C	7,500 psi	51.7 MPa
Compressive Modulus @ 77°F/25°C	245 ksi	1,688 MPa

Electrical Properties - tested per ASTM D149, D150.

	0.1 KHz	1.0 KHz	10.0 KHz
Dielectric Constant	4.33	4.29	4.17
Dissipation Factor	.018	.014	.028
Volume Resistivity (ohm-cm)	1.36×10^{14}		
Surface Resistivity (ohm)	4.94×10^{14}		
Thermal Conductivity (cal/sec-cm-°C)	4.50×10^{-4}		

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
DANGER! Causes severe skin and eye burns. Prolonged or repeated contact may cause allergic skin reactions. Vapors may be irritating to the respiratory tract.

Rev. 10/99

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