LUNA XPC1
Electrically Conductive Structural Adhesive

Luna Innovations Incorporated
706 Forest Street Suite A
Charlottesville, VA 22902 USA
Phone: 1.434.972.9950
Fax: 1.434.972.9956
www.lunainc.com

DESCRIPTION

Luna XPC1 is a two component (2K) epoxy formulation with application properties, pot life, and cure time similar to traditional 2K structural adhesives such as Hysol EA9394. XPC1 is suitable for use with bare and treated aluminum alloy, titanium alloy, and carbon composites. The adhesive demonstrates comparable aluminum lap shear strength to Hysol EA9394 and exhibits low bond resistance.

Luna XPC1 is an all carbon adhesive variant for nickel intolerant applications. It is suitable for injection bonding, butter bonding, and some filling/potting applications. It has also been demonstrated for use in bonding applications for ESD protection and EMI shielding, and possibly lightning strike.

Features:

Mechanical strength of structural adhesives
Electrical conductivity of common conductive adhesives
Room temperature cure
Low outgassing
Improved corrosion performance
Allows for increased assembly and repair speed
Injection bonding, butter bonding and potting applications
Long pot life

CURING

Bonded parts should be held in contact with light pressure until the adhesive is set. Handling strength will occur in 24 hours @ 77°F/25°C, after which the applied pressure may be removed. Since full bond strength has not yet been attained, load application should be small at this time.

Room Temperature Cure – Bonded parts may be cured for 3 to 5 days @ 77°F/25°C to achieve normal performance.

Elevated Temperature Cure – Accelerated cure may be achieved by heating bonded parts for 2 hours @ 150°F/66°C.

SURFACE PREPARATION

Bonding surfaces should be clean, dry and properly prepared. Prepare surfaces in a similar manner as for typical structural paste adhesives.

MIXING

The Part A resin requires an appropriate amount of corresponding Part B curative (see mix ratios on next page). When mixing Part A and Part B components, a total quantity no less than five grams is required to ensure optimal adhesive performance is attained. Mixed XPC1 adhesive exhibits a viscosity of 615 Poise prior to curing.

Gently knead together appropriate amounts of Part A and corresponding Part B components to form a paste. Once paste is formed continue to knead until Part A and Part B components are entirely blended together. A total hand mixing time of 1-2 minutes should be sufficient.

Luna XPC1	Mix Ratio By Weight	Part A	Part B
		100	27.5

IMPORTANT! Heat buildup during or after mixing is expected. Do not mix quantities greater than 450 grams as dangerous heat buildup can occur causing uncontrolled decomposition of the mixed adhesive and the liberation of toxic fumes. Mixing smaller quantities will minimize heat buildup.

HANDLING PRECAUTIONS

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

STORAGE AND WASTE DISPOSAL

Storage information is given on the Material Safety Data Sheet for each adhesive component. The expected shelf life of the adhesives is 6-months from the date of production when stored in the original containers at room temperature. The pot life of the mixed adhesives is estimated to be approximately 60 minutes.

BOND STRENGTH PROPERTIES

Tensile lap shear strength measured per ASTM D1002 in accordance with MMM-A-132B. Type I, Class 3, Form P specifically defines heat resistant paste adhesives for use in bonding primary and secondary structural and external metallic airframe parts – same classification as Hysol EA9396/9394.

	Typical Results	
Test Temperature / After Exposure to	**psi**	**MPa**
75°F	4950	34.1
10 min at 180°F	3735	25.8
10 min at -67°F	2225	15.3
75°F / 30 days at 120°F & 95-100% RH	4709	32.5
75°F / 7 days immersion in hydraulic oil & turbine fuel	4816	33.2
75°F / 30 cycles between -300°F and +300°F	3148	21.7

Tensile lap shear strength measured per ASTM D1002 on conductive substrates. Adhesives have demonstrated performance on M55J-RS3C carbon composite similar to Hysol EA9394. Metallic substrates may be treated with Alodine 600 or AC-130 prior to adhesive application to maintain conductivity.

Conductive Substrate / Test Temperatures	Typical Results psi	MPa
M55J/RS3C Carbon Fiber Composite / 75°F	3623	25.0
AC-130 treatment on AA2024-T3 / 75°F	2153	14.8

Ultimate shear stress measured per ASTM D565. Tests conducted on lap samples of phosphoric acid anodized and primed AA2024-T351 substrates. Average coupon bond thickness was 0.035-0.040".

ASTM D5656 Test Temperature	Typical Results psi	MPa
-250 ± 10°F	3197	22.0
72 ± 10°F	4960	34.2
250 ± 10°F	1960	13.5

ELECTRICAL/PERFORMANCE PROPERTIES

Performance Property	Typical Results
Thin Bond Resistance, 5mil (per ASTM D2739)	0.5 Ω
Thick Bond Resistance, 20 mil (per ASTM D2739)	2 Ω
Volume Resistivity (per ASTM D2739)	250 Ω-cm
Total Mass Loss (per ASTM E595)	0.54%
Collected Volatile Condensable Matter (per ASTM E595)	<0.01%
Thermal Conductivity*	0.6 W/mK

** measured on cured samples using a Hot Disk Thermal Constants Analyzer*