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PRODUCT DATA SHEET
TWO-PART GENERAL USE EPOXY
A-1177-B, A-1228-B, A-1273-B

Last updated: 03/05

DESCRIPTION
A-1177-B is a versatile two-part room temperature curing adhesive. The product cures in 8-16 hours at room temperature to provide a movable assembly or may be accelerated with heat. A-1177-B provides a hard, durable bond. Viscosity variations, A-1228-B and A-1273-B, are available.

FEATURES & BENEFITS
- Easy to use, flowable paste
- Versatile; bonds many materials
- Serviceable to 180°F *(82°C)*
- Viscosity variations: A-1228-B, A-1273-B
  - A-1228-B has more flow, may be brushed
  - A-1273-B is more thixotropic, no run, no sag paste
- Color coded for easy mixing
- Mix ratio for all three products is 1:1 by weight or volume within 5% accuracy
- Contains no solvents, no asbestos, 100% solids

USES
A-1177-B conforms to MMM-A-134, Type 1 and MMM-A-132, Type 1, Class 3, Form P, GR1, Rev A specifications. As well as:

Hughes/McDonnel Douglas	HMS 1068 CL2 Rev K
	HMS 20-2034 F1
	HP 16-25 Type 13, Class A
Lockheed, Aircraft	LAC C30-773 TY1
Lockheed, Missile	MIS 31667
	U.S. Army Electronics Command SM-C-773522-1

A-1273-B conforms to MMM-A-132 TY1, CL3. As well as:

Bell	299-947-100 TY1, CL3
Lockheed	LAC-C30-773 TY4
	LCM-30-1247
General Dynamics	26-22-483
	101 or 336
Hughes	HMS 20-2034 F2

TYPICAL TECHNICAL DATA:	A-1177-B	A-1228-B	A-1273-B
Calculated Coverage per gal/mil	1600 SF	1600 SF	1600 SF
	(39.0m5/liter/.0254mm)		
Weight per Gallon - Resin	11.4 lbs *(1.4 kg/l)*	9.5 lbs *(1.1 kg/l)* ***DISCONTINUED***	11.5 lbs *(1.4 kg/l)* ***DISCONTINUED***
- Catalyst	11.7 lbs *(1.4 kg/l)*	10.0 lbs *(1.2 kg/l)*	11.9 lbs *(1.4 kg/l)*
Viscosity (cps): Part A	41,500	15,000	1,500,000
Part B	88,500	210,000	1,400,000
Volume resistivity (ohm-cm)	7.9×10^{14}		
Dielectric Strength	583		
ASTM D149 (volts/mil)			
Shelf Life	12 months from date of shipment		

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PERFORMANCE PROPERTIES

TYPICAL TECHNICAL DATA AND PERFORMANCE PROPERTIES GIVEN FOR REFERENCE ONLY. NOT FOR SPECIFICATION PURPOSES.

The following data was obtained by bonding chromic acid etched 2024-T3 Alclad aluminum with A-1177-B and testing in accordance with MMM-A-134, Type 1.

TEST	CONDITIONING	TEST TEMP.		MIL SPEC REQUIREMENTS		A-1177-B RESULTS	
		°F	°C	PSI	MPa	PSI	MPa
Shear	30 min @ 67°F *(-55°C)*	-67	-55	1300	9.0	3030	20.9
Shear	Room Temperature	73	23	2500	17.2	2930	20.2
Shear	30 min. @ 180°F *(82°C)*	180	82	1250	8.6	2320	16.0
Shear	60 min. @ 160°F *(71°C)* 30 min. @ -67°F *(-55°C)*	-67	-55	1800	12.4	3000	20.7
Shear	60 min. @ 160°F *(71°C)*	73	23	2500	17.2	3300	22.8
Creep-Rupture	Room Temperature	73	23	1600	11.0	No failure	
Creep-Rupture	Room Temperature	180	82	300	2.1	No failure	
Fatigue	10^7 Cycles	73	23	650	4.5	No failure	
Cleavage	Room Temperature	73	23	1000	6.9	1660	11.4
Shear	250 Hr. Salt Spray	73	23	2250	15.5	2720	18.8
Shear	168 Hrs. Accelerated Weather	73	23	2000	13.8	2990	20.6
Shear In	7 days immersion						
	Distilled water	73	23	2400	16.6	2990	20.6
	Anti-Icing Fluid	73	23	2400	16.6	2920	20.1
	Hydraulic Oil	73	23	2400	16.6	2920	20.1
	JP-4 Jet Fuel	73	23	2400	16.6	2940	20.3
	Hydrocarbon Fluid	73	23	2400	16.6	2910	20.0

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PERFORMANCE PROPERTIES (CONTINUED)

The following data was obtained by bonding chromic acid etched 2024 T3 Alclad aluminum with A-1177-B and testing in accordance with MMM-A-132, Type 1, Class 3:

TEST	CONDITIONING	TEST TEMP.		MIL SPEC REQUIREMENTS		A-1177-B RESULTS	
		°F	°C	PSI	MPa	PSI	MPa
Shear	Room Temperature	75±5	23±2	2500	17.2	3478	24.0
Shear	10 Min. @ 180°F *(82°C)*	180±5	82±2	1250	8.6	2044	14.1
Shear	10 Min. @ -67°F *(-55°C)*	-67±5	-55±2	2500	17.2	2581	17.8
Fatigue	10 cycles	75±5	23±2	750	5.2	Passes	
Creep-Rupture	1600 psi @ RT *(11.0 MPa @ RT)*	75±5	23±2	192 hrs/.015 in. *(.038cm)* Max. Deformations		Passes	
Creep-Rupture	800 psi @ 180±5°F *(5.5 MPa @ 82±2°C)*	180±5	82±2	192 hrs/.015 in. *(.038cm)* Max. Deformations		Passes	
Shear	30 days Salt Water Spray	75±5	23±2	2250	15.5	2970	20.5
Shear	30 days @ 120±5°F *(49±2°C)* & 95-100% Relative Humidity	75±5	23±2	2250	15.5	3196	22.0
Shear	30 days in water 7 days in JP-4 MIL-J-5624	75±5 75±5	23±2 23±2	2250 2250	15.5 15.5	3648 3317	25.1 22.9
Shear	7 days in Anti-Icing Fluid MIL-F-5566	75±5	23±2	2250	15.5	3221	22.2
Shear	7 days in Hydraulic Oil MIL-H-5606	75±5	23±2	2250	15.5	3161	21.8
Shear	7 days in Std Test Fluids						
	Type I	75±5	23±2	2250	15.5	3464	23.9
	Type II	"	"	"	"	3073	21.2
	Type III	"	"	"	"	3313	22.8
	Type IV	"	"	"	"	3138	21.6
	Type V	"	"	"	"	3183	21.9
	Type VI	"	"	"	"	3242	22.4
	Type VII	"	"	"	"	3081	21.2

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PERFORMANCE PROPERTIES (CONTINUED)

The following data was obtained by bonding chromic acid etched 2024-T3 Alclad aluminum with A-1273-B and testing in accordance with MMM-A-132, Type I:

TEST	CONDITIONING	TEST TEMP.		MIL SPEC REQUIREMENTS		A-1273-B RESULTS	
		°F	°C	PSI	MPa	PSI	MPa
Shear	Room Temperature	75±5	23±2	2500	17.2	2866	19.8
Shear	10 Min. @ 180°F *(82°C)*	180±	82±2	1250	8.6	1661	11.5
Shear	10 Min. @ -67°F *(-55°C)*	-67±5	-55±2	2500	17.2	2521	17.4
Fatigue	10^6 cycles	75±5	23±2	750 *(5.2)* @ 10^6 Cycles		Passes	
Creep-Rupture	1600 psi @ RT *(11.0 MPa @ RT)*	75±5	23±2	192 hrs/.015 in. *(.038cm)* Max. Deformations		Passes	
Creep-Rupture	800 psi @ 180°F *(5.5 MPa @ 82°C)*	180±5	82±2	192 hrs/.015 in. *(.038cm)* Max. Deformations		Passes	
Shear	30 days Salt Water Spray	75±5	23±2	2250	15.5	2614	18.0
Shear	30 days @ 120°F *(49°C)* & 95-100% Relative Humidity	75±5	23±2	2250	15.5	3495	24.1
Shear	Fluid Immersion 30 Days in Tap Water 7 Days in JP-4 Fuel MIL-J-5624 7 Days in Anti-Icing Fluid MIL-F-5566 7 Days in Hydraulic Oil, MIL-H-5606 7 Days in Std. Test Fluids Type I Type II Type III Type IV Type V Type VI Type VII	75±5	23"±2	2250 2931	15.5 20.2	3495 3138 2879 3117 3084 3126 3094 2990 2998 3045 2931 3157	24.1 21.6 19.9 21.5 21.3 21.6 21.3 20.6 20.7 21.0 20.2 21.8

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PERFORMANCE PROPERTIES (CONTINUED)

The following data was obtained by bonding chromic acid etched 2024-T3 Alclad aluminum with A-1273-B and A-1228-B and testing in accordance with MMM-A-134, Type I.

TEST	CONDITIONING	TEST TEMP.		MIL SPEC REQ'TS		A-1273-B RESULTS		A-1228-B RESULTS	
		°F	°C	PSI	MPa	PSI	MPa	PSI	MPa
Shear	30 Min. @ -67°F *(-55°C)*	-67	-55	1300	9.0	2310	15.9	2383	16.4
Shear	Room Temperature	73	23	2500	17.2	2988	20.6	4350	30.0
Shear	30 Min. @ 180°F *(82°C)*	180	82	1250	8.6	2263	15.6	2517	17.4
Shear	60 Min. @ 160°F *(71°C)* 30 Min. @ -67°F *(-55°C)*	-67	-55	1800	12.4	2595	17.9	2440	16.8
Shear	60 Min. @ 160°F *(71°C)*	73	23	2500	17.2	2842	19.6	4510	31.1
Creep-Rupture	Room Temperature	73	23	1600	11.0	Passes		Passes	
Creep-Rupture	Room Temperature	180	82	300	2.1	Passes		Passes	
Fatigue	10^7 Cycles	73	23	650	4.5	Passes		Passes	
Cleavage	Room Temperature	73	23	1000	6.9	1268	8.7	1720	11.9
Shear	250 hrs. Salt Spray	73	23	2250	15.5	2607	17.9	2575	17.8
Shear	168 hrs. Accelerated Weather	73	23	2000	13.8	2874	19.8	3718	
Shear	7 Day Immersion - Distilled Water Anti-Icing Fluid Hydraulic Oil JP-4 Jet Fuel Hydrocarbon Fluid	73 " " " "	23 " " " "	2400 " " " "	16.6 " " " "	3206 2898 2893 3038 2954	22.1 20.0 20.0 20.9 20.4	2500 3800 3766 3783 3683	17.2 26.2 26.0 26.1 25.4

APPLICATION METHOD

Surface Preparation

Pre-bond Treatments & Metal Cleaning

1. All surfaces should be free of wax, dirt and grease. The cleaning of metal surfaces may be accomplished by washing with clean solvent or with strong alkali detergent solution. Several of the heavy-duty household cleaning compounds, such as Spic & Span, are suitable for use.

   The cleaning of the metal surface should be continued until, when rinsed with clean water, a break free water film is formed on the surface with no special pretreatment.

2. Bonding to aluminum requires a special pre-bonding treatment. A suitable treatment is immersion in chromic acid solution for 10 minutes @ 160°F *(71°C)*.

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APPLICATION METHOD (CONTINUED)

The chromic acid solution may be prepared by mixing 10 parts by weight of concentrated sulfuric acid with 30 parts by weight of water. Add acid slowly to water with constant stirring during addition. After the acid-water mixture has cooled to below 120°F *(49°C)*, add 1 part weight of sodium or potassium dichromate.

After immersion in the chromic acid solution, the metal parts should be thoroughly rinsed in clean, potable water. When available rinse water contains high solids, it is recommended the parts be given a final rinse in distilled water.

Pickled parts should be force dried for 30 minutes at 160°F *(71°C)* to remove all water film, or given a sufficient time to dry completely at room temperature.

When immersion of the parts to be bonded in acid pickle is not possible, make a heavy paste of the acid pickling solution and barites (barium sulfate). Trowel the acid paste mixture onto the cleaned metal surface and allow it to stand 30 minutes at room temperature. Rinse thoroughly and dry before bonding.

Caution: Chromic acid solutions are severely corrosive to the skin, eyes and all mucous membranes. All personnel using such solutions should wear rubber gloves and eye protection devices. Any spillage on the skin should be immediately removed thoroughly washing with soap and water. In cases of accidental ingestion, immediate flushing of the mouth with water should be done, and the individual should then be referred to a physician.

Application of the Adhesive
Mixing Instructions

1. Stir each component in its container as received until homogenous. It is recommended that this material should not be packaged in containers that cannot be agitated as settling may occur.
2. Measure an equal volume or weight of each component into a suitable mixing container. Stir until the adhesive is a uniform green color and there are no streaks. Thorough mixing is important.
3. Do not use any solvent with this adhesive.

Application to Part

1. Apply the mixed adhesive in a thin, even layer on each surface to be bonded. Press the adhesive coated surfaces together with sufficient pressure to assure adhesive contact over the entire area. A small amount of adhesive flow out at the edge of the bond line assures full contact. Any type of holding device which will maintain assembly in contact position during cure will be satisfactory for clamping. Only contact pressure is required during cure.
2. Any adhesive bond line thickness between .005" *(.013cm)* and .015" *(.038cm)* will give satisfactory bond strength. Beyond these limits, some loss of bond strength may be experienced.
3. Application of the adhesive may be conveniently accomplished by use of a putty knife, spatula, tongue depressor, or any other available flat-bladed applicator.
4. At a normal spread rate of 1600 SF per gallon (.001") *(39.3m5/liter)*, one pint of mixed adhesive will yield 200 SF *(19m5)* of bonded area.
5. One spread coat applied to each surface is recommended.

CURE

The adhesive coated metal parts must be assembled within the time limit specified for pot life; that is, the total time between mixing the adhesive and final assembly should not exceed 6 hours at 0°F *(-18°C)* 2 hours @ 73°F *(23°C)* or 50 minutes at 100°F *(38°C)*.

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CURE (CONTINUED)

Cure may be accomplished with any of the following schedules:

24-48 hours @ 75°F *(23°C)*
4 hours @ 120°F *(49°C)*
1 hour @ 160°F *(71°C)*
30 minutes @ 220°F *(104°C)*
15 minutes @ 250°F *(121°C)*

High temperature cures may exhibit excessive flow-out of the adhesive, resulting in a starved bond line with incomplete fill of the bonding area. This problem may be avoided by allowing adhesive to cure initially at 120°F *(49°C)* or lower temperature before the application of heat. Curing time in excess of those listed in the foregoing will do no harm. Curing temperatures in excess of those listed are not recommended.

Pressure during cure is not critical. Do not squeeze excessive amounts of adhesive from the joint. Maintain enough pressure during cure to maintain the initial position of the parts as assembled.

CLEAN UP

Cleaning of the mixing and spreading equipment before the adhesive has cured may be easily accomplished by washing with toluene, ketone or any lacquer solvent.

STORAGE

Material should be stored at either room temperature 70-100ºF *(21-38ºC)* or frozen. Do not store at 45-60ºF *(7-16ºC)* as this may cause crystallization. After mixing the components in a total mass of 350 gram, the working or pot life is over 6 hours at 0°F *(-18°C)*, over 2 hours at 73°F *(23°C)* and 50 minutes at 100°F *(38°C)*.

ALTERATION

The fabricator using these adhesives shall not alter the material in any manner whatsoever when using it to MMM-A-134, Type I or MMM-A-132, TY1, CL3.

SHELF LIFE

The shelf life of this product is twelve months from date of shipment.

CAUTION

These adhesives may produce mild irritation of the skin and dermatitis after frequent and prolonged contact. Precautions should be taken to prevent skin contact in handling the catalyzed mixture. If accidental skin contact occurs during use, the contaminated skin areas should be washed immediately with soap and water. Any clothing contaminated by the adhesive should be removed and cleaned immediately.

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EPOXY SAFETY SHEET

Read Material Safety Data Sheet before handling, storing or using this product.

Important Safety Information - Read Before Using This Product

WARNING- This product may cause skin sensitization, dermatitis, or other allergic responses. Prevent all contact with skin. If skin contact occurs, the contaminated skin areas should be washed immediately with soap and water. Any clothing contaminated by the epoxy should be removed and cleaned immediately. Avoid inhalation of vapor. Work area should be well ventilated. **DANGER**- PREVENT CONTACT WITH EYES. IF EYE CONTACT OCCURS, IMMEDIATELY FLUSH WITH WATER FOR 15 MINUTES AND SEEK PROMPT MEDICAL ATTENTION. THIS PRODUCT IS HARMFUL IF SWALLOWED AND CAN CAUSE SERIOUS PERSONAL INJURY. IF SWALLOWED, INDUCE VOMITING: SEE A PHYSICIAN IMMEDIATELY.
PROTECTION- WEAR PROTECTIVE GLOVES, IMPERVIOUS TYPE EYE PROTECTION, SPLASH-PROOF GOGGLES (ANS 1287.1 1968).

EMPTY CONTAINER AND WASTE DISPOSAL - Scrap must be stored in an isolated and segregated area while awaiting disposal and should, in no event, be mixed with other types of scrap. Disposal by an industrial waste firm that is qualified to handle hazardous materials is recommended. Disposal must be by burial in accordance with state, local and federal regulations. Observe all of the above warnings and instructions with scrap material and empty containers. For industrial and professional use only. If resold or repackaged for household use, containers must be labeled in accordance with the Federal Hazardous Substances Labeling Act and other laws and the label must be approved by HENKEL Adhesives, Inc.

LIMITED WARRANTY
Except as provided below, we warrant our products to be free of defects and manufactured to meet published physical properties when cured and tested according to applicable specifications and SIA Adhesives, Inc. standards. Under this warranty, we will provide, at no charge, product in containers to replace any product proved to be defective when applied in accordance with our written instructions, and in applications recommended by us as suitable for this product. All claims must be in writing and must be made within 30 days of shipment. The absence of claims during this period will constitute a waiver of all claims with respect to claims with respect to such product. This warranty is IN LIEU OF any and all other warranties, expressed or implied, including but not limited, any implied warranty of MERCHANTABILITY or fitness for a particular purpose.

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