

Advanced Materials**ARALDITE® 2027 A/B**

(XD 4712/HARDENER XD 4713)

TWO-COMPONENT POLYURETHANE ADHESIVE

Description

ARALDITE 2027 A/B polyurethane adhesive is a two-component, room-temperature curing, beige-colored system. It is thixotropic and is specially designed for bonding of SMC as well as many other thermoset and thermoplastic materials. It is also suitable for joining metal substrates.

Applications

ARALDITE 2027 A/B polyurethane adhesive is suitable for bonding:

SMC
Thermoplastics
Metals
Composites

Advantages

Primerless SMC bonding
Flexible
10-minute assembly time
Bonds well to most thermoplastics
Good gap-filling capability

Typical Properties	Property	Test Method	Test Values ¹	
			Resin	Hardener
	Color/appearance	Visual	BeigeLiquid	Beige Liquid
	Specific Gravity	ASTM D-792	1.50	1.45
	Viscosity, cP @ 77°F (25°C)	ASTM D-2393	18,000	20,000

¹ Tested at 77°F (25°C)

Typical Mixed Properties	Property	Test Method	Test Values ¹
	Reaction Ratio (by weight)		100R/97H
	Reaction Ratio (by volume)		100R/100H
	Pot Life, minutes @ 77°F (25°C), 4 fl. oz. mass	ASTM D-2471	8 - 10
	Mixed viscosity, cP @ 77°F (25°C)	ASTM D-2393	Thixotropic Paste

¹ Tested at 77°F (25°C)

Recommended Cure Schedules	Temperature	Handling Strength	Minimum Cure Time
	50°F (10°C)	5.5 hours	27 hours
	59°F (15°C)	4 hours	22 hours
	77°F (25°C)	1.5 hours	8 .5 hours
	104°F (40°C)	40 minutes	4 hours
	140°F (60°C)	15 minutes	20 minutes
	176°F (80°C)	5 minutes	14 minutes

¹Tested @ 77°F (25°C)

Processing

Application of Adhesive

The resin/hardener mix is applied with a spatula to the pretreated and dry joint surfaces.

A layer of adhesive 0.002 to 0.004-inches (0.05 to 0.10-mm) thick will normally impart the greatest lap shear strength to a joint.

The joint components should be assembled and clamped as soon as the adhesive has been applied. Even contact throughout suffices to ensure proper cure.

Standard Test Specimens

Unless otherwise stated, the figures given below were all determined by testing standard specimens made up by lap-jointing 4-inch x 1-inch x 0.06-inch (10-cm x 2.5-cm x 1.5-mm) strips of aluminum. The joint area was 0.5 x 1 inch (12.5 mm x 2.5 cm) in each case.

Typical Physical Properties**Lap Shear Strength, psi (MPa)*****Tested on Metal Substrates***

Cured 16 hours @ 104°F (40°C)

Test Method

ASTM D-1002

<u>Metal</u>	<u>Substrate Thickness (in./mm)</u>	<u>Test Values</u>
Aluminum	0.039/1.0	1950 (13.4)
Carbon Steel	0.039/1.0	2025 (13.9)
Stainless Steel	0.039/1.0	2050 (14.1)
Galvanized Steel ¹	0.06/1.5	1000 (6.9)
Copper	0.06/1.5	1700 (11.7)
Brass	0.06/1.5	1100 (7.6)

¹Surface degreased only, not roughened.**Lap Shear Strength, psi (MPa)*****Tested on Plastic Substrates***

Cured 16 hours @ 104°F (40°C)

Test Method

ASTM D-1002

<u>Substrate</u>	<u>Test Values</u>
SMC	1100 (7.6)
ABS	700 (4.8)
Polycarbonate	975 (6.7)
Acrylic	1000 (6.9)
GRP	975 (6.7)
GRE	1225 (8.4)
Nylon	300 (2)
PVC	600 (4.1)

Lap Shear Strength, psi (MPa)***Effect of Test Temperature***

Load applied 10 minutes after specimens reach test temperature.

<u>Cure Cycle</u>	<u>Test Temp.</u>	<u>Test Values⁽¹⁾</u>
7 days @ 77°F (25°C)	-58°F (-50°C)	2900 (20)
	-22°F (-30°C)	2900 (20)
	-4°F (-20°C)	2750 (18.9)
	32°F (0°C)	2950 (20.3)
	68°F (20°C)	2030 (14)
	104°F (40°C)	1150 (7.9)
	140°F (60°C)	725 (5)
	176°F (80°C)	600 (4.1)
	212°F (100°C)	450 (3.1)
24 hours @ 77°F (25°C) + 30 minutes @ 176°F (80°C)	-58°F (50°C)	3025 (20.8)
	-22°F (-30°C)	3200 (22)
	-4°F (-20°C)	3350 (23.1)
	32°F (0°C)	3350 (23.1)
	68°F (20°C)	2750 (18.9)
	104°F (40°C)	1300 (8.9)
	140°F (60°C)	725 (5)
	176°F (80°C)	600 (4.1)
	212°F (100°C)	450 (3.1)

¹Tested @ 77°F (25°C)

Typical Physical Properties**Lap Shear Strength on Aluminum, psi (MPa)*****Effect of Immersion***

Cure cycle 16 hours @ 104°F (40°C). Immersion for 90 days in media listed.

<u>Media</u>	<u>Test Values⁽¹⁾</u>
Standard - As prepared	2050 (14.1)
IMS	1800 (12.4)
Gasoline	1975 (13.6)
Acetic Acid	600 (4.1)
Acetic Acid 10% - 30 day immersion	1875 (12.9)
Xylene	450 (3.1)
Lubricating Oil - HD30	2475 (17)
Paraffin	2675 (18.4)
Water @ 68°F (20°C)	2250 (15.5)
Water @ 140°F (60°C)	1125 (7.7)
Water @ 194°F (90°C)	1800 (12.4)

Lap Shear Strength, psi (MPa)***Effect of Tropical Exposure***

(104°F/40°C/92% R.H.)

On Aluminum

<u>Cure Cycle</u>	<u>Exposure Time</u>	<u>Test Values⁽¹⁾</u>
16 hrs @ 104°F (40°C)	0 days	2050 (14.1)
	30 days	1950 (13.4)
	60 days	1875 (12.9)
	90 days	2100 (14.5)

On SMC

<u>Cure Cycle</u>	<u>Exposure Time</u>	<u>Test Values⁽¹⁾</u>
16 hrs @ 104°F (40°C)	0 days	1075 (7.4)
	30 days	1150 (7.9)
	60 days	1000 (6.9)
	90 days	600 (4.1)

Lap Shear Strength, psi (MPa)***Effect of Heat Aging***

Cured 16 hours @ 104°F (40°C).

On Aluminum

<u>Aging Temperature</u>	<u>Exposure Time</u>	<u>Test Values</u>
158 °F (70°C)	0 days	2050 (14.1)
	30 days	2475 (17)
	60 days	3200 (22)
	90 days	3475 (23.9)

On SMC

<u>Aging Temperature</u>	<u>Exposure Time</u>	<u>Test Values</u>
158 °F (70°C)	0 days	1075 (7.4)
	30 days	1250 (8.6)
	60 days	1250 (8.6)
	90 days	900 (6.2)

Typical Physical Properties continued

Property	Test Method	Test Values¹
Elongation, %	ASTM D-638	15
Tensile Strength, psi (MPa)	ISO R527	2050 (14.1)
Roller Peel Test, pli (N/mm)	ISO 4578	46 (8)
Glass Transition Temperature, °F (°C)	ASTM D-4065	59 (15)
Thermal Cycling – 100 cycles of 6 hr. duration from -22°F to 158°F (-30°F to 70°C), psi (MPa)		1350 (9.3)

¹Tested @ 77°F (25°C)

Storage and Shelf Life

ARALDITE polyurethane adhesive components should be stored in their original, sealed containers at room temperature. Keep containers closed to prevent moisture absorption and contamination. These products are moisture sensitive and packaged under a blanket of dry nitrogen. If a container is opened, re-blanket with dry nitrogen and then tightly reseal.

When stored at temperatures from 59-77°F (15-25°C), the resin and hardener will remain in useable condition for 6 months from date of shipping from Huntsman.

Caution:

Huntsman Advanced Materials Americas Inc. maintains up-to-date Material Safety Data Sheets (MSDS) on all of its products. These sheets contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our products. Users should review the latest MSDS to determine possible health hazards and appropriate precautions to implement prior to using this material. Copies of the latest MSDS may be requested by calling our customer service group at 888-564-9318 or emailing your request to adhesives@huntsman.com.

First Aid!

Eyes and skin: Flush eyes with water for 15 minutes. Contact a physician if irritation persists. Wash skin thoroughly with soap and water. Remove and wash contaminated clothing before reuse.

Inhalation: Remove subject to fresh air.

Swallowing: Dilute by giving water to drink and contact a physician promptly. Never give anything to drink to an unconscious person.

**KEEP OUT OF REACH OF CHILDREN
FOR PROFESSIONAL AND INDUSTRIAL USE ONLY**

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