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Advanced Materials

ARALDITE® AW 106 Resin Hardener HV 953U

MULTI-PURPOSE EPOXY ADHESIVE

DESCRIPTION

ARALDITE AW 106 Resin/Hardener HV 953U epoxy adhesive is a multi-purpose, viscous material that is suitable for bonding a variety of materials, including metal, ceramic, and wood. The electrically insulating adhesive is easy to apply either manually by spatula and stiff brush or mechanically with meter/mix and coating equipment. Araldite AW 106 Resin/Hardener HV 953U epoxy adhesive cures at temperatures from 68°F (20°C) to 356°F (180°C) with no release of volatile constituents.

FEATURES

Metal
Ceramics
Wood
Vulcanized Rubber
Foams
Plastics

ADVANTAGES

Long open time
High shear and peel strength
Easy to apply
Good resistance to static and dynamic loads
Electrically insulating

TYPICAL PROPERTIES

		Test Values[1]	
Property	**Test Method**	**Resin**	**Hardener**
Color/appearance	Visual	Creamy viscous liquid	Amber liquid
Specific Gravity	ASTM D-792	1.17	0.92
Viscosity, cP @ 77°F (25°C)	ASTM D-2393	50,000	35,000

TYPICAL MIXED PROPERTIES

Property	Test Method	Test Values[(1)]
Reaction Ratio (by weight)		100R/80H
Reaction Ratio (by volume)		100R/100H
Pot Life, hrs.@ 77°F (25°C), 4 fl. oz. mass	ASTM D-2471	2
Mixed viscosity, cP @ 77°F (25°C)	ASTM D-2393	45,000

[1]Tested @ 77°F (25°C)

RECOMMENDED CURE SCHEDULES

Temperature	Handling Strength	Minimum Cure Time
68°F (20°C)	12 hours	15 hours
77°(25°C)	7 hours	12 hours
104°F(40°C)	2 hours	3 hours
158°F(70°C)	30 minutes	50 minutes
212°F(100°C)	6 minutes	10 minutes
302°F(150°C)	4 minutes	5 minutes

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

		Test Method
Lap Shear Strength, psi (MPa)		ASTM D-1002
Effect of Cure Time and Test Temperature		
Load applied 10 minutes after specimens reach test temperature.		
Cure Temperature	**Test Time**	**Test Values[(1)]**
77°F (25°C)	8 hours	710(4.9)
	15 hours	1990(13.7)
	24 hours	2130(14.7)
	72 hours	2280(15.7)
	5 days	2560(17.6)
	1 hour	3130(21.5)
158°F(70°C)		
	2 hours	3410(23.5)
	3 hours	3200 (22)
	10 minutes	3700 (25.5)
212°F(100°C)		
	20 minutes	3980 (27.4)
	30 minutes	4120(28.4)
302°F(150°C)	5 minutes	4270 (29.4)
	10 minutes	4410(30.4)
	20 minutes	4410(30.4)

[1]Tested @ 77°F (25°C)

		Test Method
Lap Shear Strength, psi (MPa)		ASTM D-1002
Effect of Test Temperature		
Load applied 10 minutes after specimens reach test temperature.		
Cure Cycle	**Test Temp.**	**Test Values[(1)]**
5 days @ 77ºF (25ºC)	-76°F (60°C)	2840(19.5)
	-4°F (-20°C)	2840(19.5)
	68°F (20°C)	2560(17.6)
	104°F(40°C)	1420(9.8)
	140°F(60°C)	570 (3.9)
20 min. @ 212°F(100°C)	-76°F (-60°C)	3560 (24.5)
	-46°F (-20°C)	3410(23.5)
	68°F (20°C)	3980 (27.4)
	104°F(40°C)	1990(13.7)
	140°F(60°C)	1000 (6.9)

[1]Tested @ 77°F (25°C)

	Test Method
Lap Shear Strength, psi (MPa)	ASTM D-1002

Effect of Immersion

Cure cycle 16 hours @ 104ºF (40ºC). Immersion for 90 days in media listed.

Properties	Test Values[(1)]
Standard - As prepared	2560(17.6)
Acetone (30 days)	570 (3.9)
Acetylene	430 (2.9)
Gasoline	2410 (16.6)
Ethyl Acetate (30 days)	570 (3.9)
Acetic Acid 10%	Degraded
Methanol	Degraded
Lubricating Oil - HD30	2560(17.6)
Kerosene	Degraded
Trichloroethylene	Degraded
Water @ 68°F (20°C)	1420(9.8)
Water @ 194°F (90°C)	430 (2.9)

Lap Shear Strength, psi (MPa)
Effect of Tropical Exposure
(104ºF/40ºC/92% R.H.)

Cure Cycle	Exposure Time	Test Values[(1)]
16 hrs. @ 104ºF (40ºC)	0 days	2560(17.6)
	10 days	2560 (17.6)
	30 days	1710(11.8)
	60 days	1560(10.7)
	90 days	570 (3.9)
20 min. @ 212ºF (100ºC)	0 days	3980 (27.4)
	10 days	2560(17.6)
	30 days	1710(11.8)
	60 days	1560(10.7)
	90 days	1280 (8.8)

[1]Tested @ 77°F (25°C)

Lap Shear Strength, psi (MPa)
Effect of Heat Aging
Cured 16 hours @ 77ºF (25ºC)

Aging Temperature	Exposure Time	Test Values
68ºF (20ºC)	0 days	2560(17.6)
	1 years	2560(17.6)
	2 years	2280(15.7)
	3 years	1710(11.8)
	4 years	1990(13.7)
140ºF (60ºC)	3 days	2560(17.6)
	10 days	2420(16.6)
176ºF (80ºC)	3 days	2130(14.7)
	10 days	2130(14.7)
	30 days	2130(14.7)
	60 days	2130(14.7)
	1 year	1280(8.8)
	2 years	710(4.9)
	3 years	710(4.9)
	4 years	430 (2.9)
248ºF (120ºC)	3 days	2130(14.7)
	10 days	2280(15.7)
	30 days	2280(15.7)
	60 days	2130(14.7)

Lap Shear Strength, psi (MPa)
Tested on Metal Substrates
Cured 20 min @ 77ºF (25ºC)

Metal	Substrate Thickness (in./mm)	Test Values
Carbon Steel	0.039/1.0	3840 (26.4)
Stainless Steel	0.039/1.0	3270 (22.5)
Galvanized Steel2	0.06/1.5	1990(13.7)
Copper	0.06/1.5	3270 (22.5)
Brass	0.06/1.5	2990 (20.6)

'Tested @ 77°F (25°C)
[2]Surface degreased only, not roughened.

	Test Method
Fatigue Strength Tested using a load frequency of 90 Hz and a 1-in. (25 mm) joint overlap (Cured 20 min. @ 212ºF/100ºC)	ASTM D-1002

Fatigue Limit Load, % Static Shear Strength	Cycles to Failure
50	$10^3 – 10^4$
40	$10^4 – 10^5$
30	10^5 -- 10^6
25	10^5 -- 10^6
20	$10^6 – 10^7$
15	$>10^7$

PHYSICAL PROPERTIES

	Test Values	Test Method
Ultimate Tensile Strength, psi (MPa)	4,800 (33)	ASTM D-638
Elongation, %	9	ASTM D-638
Tg per DMA, ºF (ºC)	146 (63)	ASTM D-4065
Hardness, Shore D	80	ASTM D-2240
Coefficient of Thermal Expansion, in./in./ºC	$8.5x10^{-5}$	ASTM E-831
Roller Peel, pli (N/mm)	28 (4.9)	ISO 4578

DIELECTRIC PROPERTIES

	Test Values
Thermal Conductivity, W/mK	0.22
Surface Resistivity, ohms	1.2E+16
Dielectric Strength, V/ml	400
Volume Resistivity, Ω cm	7.1E+14
Dielectric Constant, @ 50Hz/1KHz/10KHz	3.4/3.2/3.2
Loss Tangent, % @ 50Hz/1KHz/10KHz	1.7/1.8/2.6

STORAGE AND SHELF LIFE

ARALDITE epoxy adhesive components should be stored in their original, sealed containers at room temperature. When stored at temperatures from 59-77°F (15-25°C), the resin and hardener will remain in useable condition for three years from date of shipping from Huntsman.

SAFETY/HANDLING PRECAUTIONS

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

Personal Hygiene

Safety precautions at workplace

Protective clothing	Yes
Gloves	Essential
Arm protectors	Recommended when skin contact is likely
Goggles/safety glasses	Yes

Skin protection

Before starting work	Apply barrier cream to exposed skin
After washing	Apply barrier or nourishing cream
Cleansing of contaminated skin	Dab off with absorbent paper, wash with warm water and alkali-free soap, then dry with disposable towels. Do not use solvents.
Clean shop requirements	Cover workbenches/areas with light colored paper. Use disposable beakers.
Disposal of spillage	Soak up with sawdust or cotton waste cloth and deposit in plastic-lined bin.

Ventilation

Of workshop	Renew air 3 to 5 times an hour
Of workplaces	Exhaust fans should be used to prevent operators from inhaling vapors.

FIRST AID

Contamination of the *eyes* by resin, hardener or mix should be treated immediately by flushing with clean, running water for 10 to 15 minutes. A doctor should then be consulted.

Material smeared or splashed on the *skin* should be dabbed off, and the contaminated area then washed and treated with a cleansing cream (see above). A doctor should be consulted in the event of severe irritation or burns. Contaminated clothing should be changed immediately.

Anyone taken ill after inhaling vapors should be moved out of doors immediately.

In all cases of doubt call for medical assistance.

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.

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