Araldite® 2011 Adhesive

Product Description

Araldite® 2011 structural adhesive is a multipurpose, two component, room temperature curing, paste adhesive of high strength and toughness. It is suitable for bonding a wide variety of metals, ceramics, glass, rubber, rigid plastics and most other materials in common use. It is a versatile adhesive for the craftsman as well as most industrial applications.

Features

- Multi-purpose
- Long working life
- Low shrinkage
- Good resistance to dynamic loading
- Bonds a wide variety of materials in common use

Typical Properties*

Property	Araldite® 2011 A	Araldite® 2011 B	Mixed System
Appearance	Neutral	Pale yellow	Pale yellow
Density, g/cm^3	~1.15	~0.96	~1.05
Viscosity at 25°C, cP	30,000 - 50,000	20,000 - 35,000	30,000 - 45,000
Pot life at 25°C, 100 g, min	--	--	~100

*Properties are based on Huntsman test methods. Copies are available upon request

Processing

Mix Ratio

Product	Parts by weight	Parts by volume
Araldite® 2011 A	100	100
Araldite® 2011 B	80	100

Pretreatment

The strength and durability of a bonded joint are dependent on proper treatment of the surfaces to be bonded. At the very least, joint surfaces should be cleaned with a good degreasing agent such as acetone, iso-propanol (for plastics) or other proprietary degreasing agents in order to remove all traces of oil, grease and dirt. Low-grade alcohol, gasoline, or paint thinners should never be used. The strongest and most durable joints are obtained by either mechanically abrading or chemically etching ("pickling") the degreased surfaces. Abrading should be followed by a second degreasing treatment.

Araldite® 2011 structural adhesive is available in cartridges incorporating mixers and can be applied as ready to use adhesive with the aid of the tool recommended by Huntsman Advanced Materials.

Application of adhesive

The resin/hardener mix may be applied manually or robotically to the pretreated and dry joint surfaces. Huntsman's technical support group can assist the user in the selection of a suitable application method as well as suggest a variety of reputable companies that manufacture and service adhesive dispensing equipment. A layer of adhesive 0.002 to 0.004 in (0.05 to 0.10 mm) thick will normally impart the greatest lap shear strength to the joint. Huntsman stresses that proper adhesive joint design is also critical for a durable bond. The joint components should be assembled and secured in a fixed position as soon as the adhesive has been applied. For more detailed explanations regarding surface preparation and pretreatment, adhesive joint design, and the dual syringe dispensing system, visit www.araldite2000plus.com.

Equipment Maintenance

All tools should be cleaned with hot water and soap before adhesives residues have had time to cure. The removal of cured residues is a difficult and time-consuming operation. If solvents such as acetone are used for cleaning, operatives should take the appropriate precautions and, in addition, avoid skin and eye contact.

Cure times to reach minimum shear strength

Temperature, °F	50	59	73	104	140	212
Cure time to reach LSS* > 145 psi (1 MPa),						
hours	24	12	7	2	-	-
minutes	-	-	-	-	30	6
Cure time to reach LSS > 1450 psi (10 MPa),						
hours	36	18	10	3	-	-
minutes	-	-	-	-	45	7

*LSS = Lap shear strength

Typical Physical Properties

Unless otherwise stated, the data were determined with typical production batches using standard test methods. They are typical values only, and do not constitute a product specification.

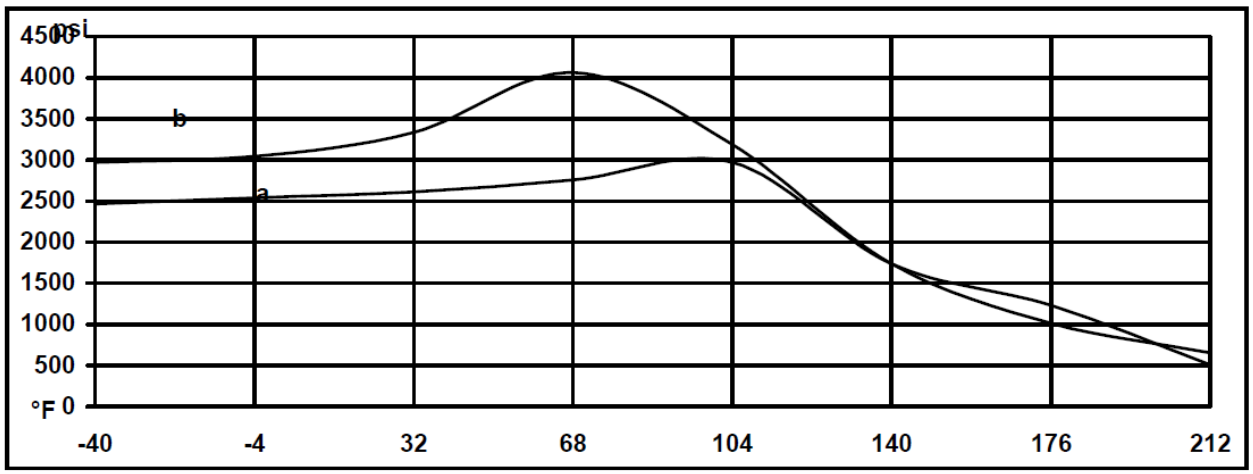
Unless a different specification is given, the figures below were all determined by testing standard specimens made by lap-jointing 4.5 x 1 x 0.063 in (114 x 25 x 1.6 mm) strips of aluminum alloy. The joint area was 0.5 x 1 in (12.5 x 25 mm) in each case. Samples were cured at 104°F (40°C) for 16 hours and tested at 23°C, unless otherwise noted.

Property	Value			Test Method
Average lap shear strength, metal-metal joints, sand blasting pre-treatment, psi				
Aluminum	3,771			ISO 4587
Steel 37/11	3,626			
Stainless steel V4A	3,191			
Galvanized steel	2,611			
Copper	3,481			
Brass	3,481			
Average lap shear strength, plastic-plastic joints, lightly abrade and alcohol degrease pre-treatment, psi				
GRP	1,639			ISO 4587
CFRP	2,770			
SMC	1,015			
ABS	798			
PVC	290			
PMMA	406			
Polycarbonate	653			
Polyamides	580			
Lap shear strength, after immersion in 23°C media, psi	30 days	60 days	90 days	
As-made value	--	--	3,735	ISO 4587
IMS	2,756	2,611	2,756	
Gasoline	0	2,827	3,118	
Ethyl acetate	2,321	2,611	3,118	
Xylene	2,901	2,901	3,191	
Lubricating oil	2,176	2,611	3191	
Paraffin	2,321	2,466	3,771	
Water at 73°F	3,118	2,756	3,597	
Water at 140°F	1,978	1,885	1,305	
Water at 194°F	1,595	1,160	290	

Lap shear strength, exposure to tropical weather,* psi Standard - As Prepared 30 days 60 days 90 days	 3,626 1,999 1,768 1,768	ISO 4587 / DIN 50015
Lap shear strength, heat aging, psi As-made value 68°F / 5 years 176°F / 60 days 176°F / 5 years 248°F / 60 days	 2,901 2,277 2,451 566 2,176	--
Roller peel test, pli (N/mm)	29 (5.0)	ISO 4578
Glass transition temperature, DSC, T_g, °F (°C)	~113 (45)	Huntsman
Electrolytic corrosion,†	A -A/B 1,2	DIN 53489
Minimum dielectric strength at 50 Hz, 75°F (24°C), kV/mm Instantaneous value 1-minute value	 25 - 27 22 - 24	VSM 77170
Water vapor permeability, 100°F, 90% RH, cure: 5 days at 73°F (23°C), g/m^2 Test on a 0.039 in thick film (24 h)	 16	NF 41001
Water absorption, % wt. 24 hours at 73°F (23°C) 30 min at 212°F (100°C)	 0.8 1.3	ISO 62-80
Thermal conductivity, cure: 20 min at 100°C, test at 73°F (23°C), W/m·K	0.22	ISO 8894/90
Shear modulus, psi (GPa) -58°F (-50°C) 32°F (0°C) 122°F (50°C) 212°F (100°C)	 217,557 (1.5) 174,045 (1.2) 29,008 (0.2) 1015 (0.007)	DIN 53445
Flexural strength, psi (MPa)	8,760 (60.4)	ISO 178
Flexural modulus, psi (MPa)	276,166 (1904.1)	ISO 178
Fatigue test on simple lap joints‡, fluctuating load as % of static shear str. 30 20 15	No. of load cycles to joint failure 10^5 - 10^6 10^6 - 10^7 > 10^7	DIN 53285

*40/92, DIN 50015; typical average values; test at 23°C.
†Cure 16 h at 104°F (40°C) or 20 min at 212°F (100°C); Test: 4 days in a conditioning chamber in 40/92 climate as specified by DIN 50015; Rating according to specified standard
‡Cure 20 min / 212°F (100°C); Mean static lap shear strength: 2364 psi (16.3 MPa); Test carried out using a load cycle frequency of 90 Hz.

Figure 1. Lap shear strength versus temperature (ISO 4587) (typical average values)
Cure: (a) = 7 days at 73°F (23°C); (b) = 24 hours at 73°F (23°C) + 30 min / 176°F (80°C)



Storage

Araldite® 2011 Adhesive should be stored in a dry place, in the original sealed containers, at temperatures between 2°C and 40°C (36°F and 104°F). Under these storage conditions, the product has a shelf life of **3 years** (from date of manufacture). The product should not be exposed to direct sunlight.

If stored below 60°F, the adhesive should be brought to 60°F - 77°F and conditioned at this temperature for some time prior to use.

Precautionary Statement

Huntsman Advanced Materials Americas LLC maintains up-to-date Safety Data Sheets (SDS) 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.

First Aid!
Refer to SDS as mentioned above.

KEEP OUT OF REACH OF CHILDREN

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