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Advanced Materials

Araldite® 2021 Structural Adhesive

Structural Adhesives

Araldite® 2021
Two component toughened methacrylate adhesive system

Key properties

- **Rapid curing**
- **High peel strength**
- **Multi purpose**
- **Excellent bond to a wide range of plastics, composites and metals**
- **Suitable for service at temperatures up to 212°F (100°C)**

Description

Araldite® 2021 structural adhesive is a two component, room temperature curing, methacrylate general purpose adhesive for rapid assembly operations on a wide range of substrates.

Product data

Properties	2021/A	2021/B	2021 (mixed)
Color (visual)	Off white	Beige / yellow	Pale yellow
Specific gravity	1.03	0.96	ca 1
Viscosity at 77°F (cp)	ca 45,000	ca 40,000	ca 45,000
Pot Life (100 gm at 77°F)	-	-	2-3 minutes
Flash point (°F)	10	10	-

Processing

Pretreatment

The strength and durability of a bonded joint are dependant on proper pretreatment of the surfaces to be bonded, however the methacrylate adhesives can be used effectively with little surface preparation.
Ideally 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.

Mix ratio	Parts by weight	Parts by volume
Araldite® 2021/A adhesive	100	100
Araldite® 2021/B adhesive	90	100

Araldite® 2021 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.

Times to minimum shear strength

Temperature	°F	50	59	73	104
Cure time to reach	hours	-	-	-	-
LSS > 145 psi (1MPa)	minutes	20	12	8	2
Cure time to reach	hours	-	-	-	-
LSS > 1450 psi (10MPa)	minutes	30	25	18	5

LSS = Lap shear strength. Note that the adhesive will reduce in volume by ca 13% during cure.

Typical cured properties

Unless otherwise stated, the figures given 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. The figures were determined with typical production batches using standard testing methods. They are provided solely as technical information and do not constitute a product specification.

Average lap shear strengths of typical metal-to-metal joints (ISO 4587)

Cured for 16 hours at 104 °F (40°C) and tested at 73°F (23°C)
Pretreatment - Sand blasting

Substrate	psi
Aluminum L165	3253
Steel 37 / 11	3368
Stainless steel V4A	4351
Galvanized steel	1955
Copper	2194
Brass	365

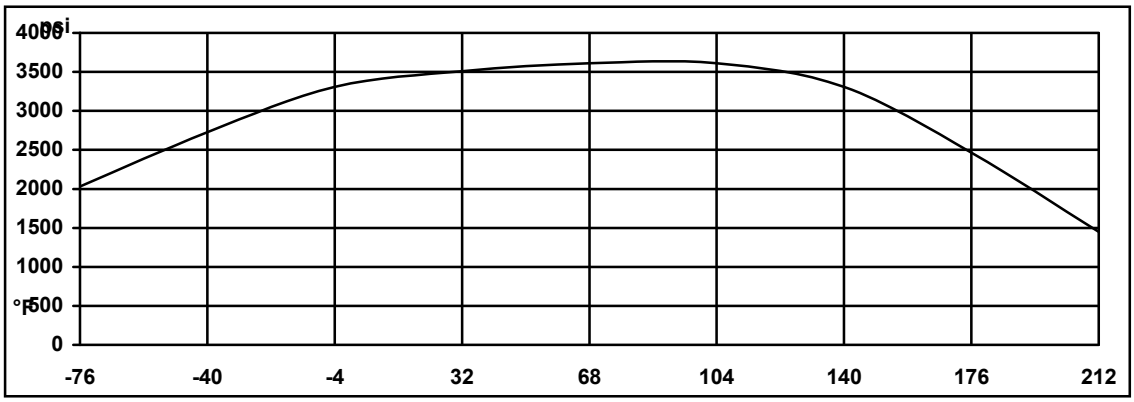
Average lap shear strengths of typical plastic-to-plastic joints (ISO 4587)

Cured for 16 hours at 104°F and tested at 73°F. Pretreatment - Lightly abrade and alcohol degrease.

Substrate	psi
GRP	1131
CFRP	1740
SMC	725
ABS	580
PVC	1088
PMMA	827
Polycarbonate	1015
Polyamides	435

Lap shear strength versus temperature (ISO 4587) (typical average values)

Cure: 7 days / 73°F (23°C)



Roller peel test (ISO 4578) 63 pli (11N/mm)

Shore hardness: D78

Elongation at break: 50 - 75%

Flexural Properties (ISO 178) Cure 1 day / 73°F (23ºC) tested at 73°F (23ºC)

Flexural Strength	5,221 psi (36.0 Mpa)
Flexural Modulus	207,433 psi (1430.2 Mpa)

Lap shear strength versus immersion in various media (typical average values)

Unless otherwise stated, L.S.S. was determined after immersion for 90 days at 73°F (23°C)

	30 days	60 days	90 days
	psi		
IMS	3229		2466
Gasoline			4197
Ethyl acetate	Failed		
Acetic acid, 10%	3215		1365
Xylene	4070		3752
Lubricating oil			4351
Paraffin	4351		4061
Water at 73°F	3202		1450
Water at 140°F	3292		2820
Water at 194°F	3024		1450

Plastic substrates – Polycarbonate and PVC Cure: 7 days at 73°F (23°C)

	30 days	60 days	90 days
	psi		
Polycarbonate			
As-made value			995
IMS	332		154
Gasoline			242
Sodium Hydroxide, 10%	154		38
Acetic acid, 10%	651		580
Xylene	Failed		

PVC			
As-made value			1110
IMS			218
Gasoline	676		524
Sodium Hydroxide, 10%			830
Acetic acid, 10%	1015		779
Xylene	136		68

Lap shear strength versus tropical weathering (40/92, DIN 50015: typical average values)

Cure: 7 days at 73°F (23°C)

	psi
As-made value	3220
After 30 days	2770
After 60 days	2524
After 90 days	2451

Lap strength versus heat ageing

Cure: 7 days at 73°F (23°C)

	psi
As-made value	3133
30 days/ 158°F	4656
60 days/ 158°F	4351
90 days/ 158°F	4351

Thermal cycling

100 cycles of 6 hour duration from -22 °F to 158°F (-30°C to 70°C): 4,337 psi (29.9 Mpa)

Test carried out using a load cycle frequency of 90 Hz.

Storage

The shelf life of Araldite® 2021/A and Araldite® 2021/B structural adhesives should be stored in a dry place, in the sealed original container, at temperatures between +2°C and +8°C (+35.6°F and 46.4°F). Under these storage conditions, the shelf life is 1 year. The product should not be exposed to direct sunlight.

The product should be never frozen.

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Precautionary Statement

Huntsman Advanced Materials Americas LLC 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.

First Aid!

Refer to MSDS as mentioned above.

KEEP OUT OF REACH OF CHILDREN

FOR PROFESSIONAL AND INDUSTRIAL USE ONLY

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