Araldite® LY 5052 Resin / Aradur® 5052 Hardener

Product Description

Araldite® LY 5052 is a low-viscosity epoxy resin that is used with Aradur® 5052, a mixture of polyamines, to form a cold curing epoxy system. This system has many applications in aerospace and industrial composites, tooling, aircraft repair.

Features

- Low viscosity, easy impregnation of reinforcement materials.
- Long pot life (2 hours for 100 mL at ambient temperature)
- Ample processing time allows production of large objects
- Ambient temperature curable with high temperature resistance (glass transition temperature) after post-cure at 100 to 120 °C
- Excellent mechanical and dynamic properties after ambient cure with potential for even higher properties after post-cure at elevated temperatures
- Laminates also show outstanding mechanical and dynamic properties.
- Qualified by the Luftfahrtbundesamt (German Aircraft Authority) for the production of gliders

Typical Properties*

Property	Araldite® LY 5052	Aradur® 5052	Test Method
Appearance	Slightly yellow liquid	Colorless liquid	Visual
Color	≤ 2	≤ 4	Gardner, ISO 4630
Density @ 25°C, g/cm^3	1.17	0.94	ISO 1675
Viscosity @ 25°C, cP	1000 - 1500	40 - 60	ISO 12058-1
Flash Point, °C	≥ 140	≥ 110	ISO 2719

*Typical properties are based on Huntsman's test methods. Copies are available upon request.

Processing

Mix Ratio

Product	Parts by weight	Parts by volume
Araldite® LY 5052	100	100
Aradur® 5052	38	47

We recommend that the components are weighed with an accurate balance to prevent mixing inaccuracies which can affect the properties of the matrix system. The components should be mixed thoroughly to ensure homogeneity. It is important that the side and the bottom of the vessel are incorporated into the mixing process.

When processing large quantities of mixture the pot life will decrease due to exothermic reaction. It is advisable to divide large mixes into several smaller containers.

Parameter	Value	Test Method
Initial Mix Viscosity, cP @ 64°F @ 77°F @ 104°F	 1150 - 1350 500 - 700 200 - 250	ISO 12058-1
Viscosity build up, min to 1500 cP @ 77°F to 3000 cP @ 77°F to 1500 cP @ 104°F to 3000 cP @ 104°F to 1500 cP @ 140°F to 3000 cP @ 140°F	 50 - 60 90 - 110 40 - 45 50 - 60 15 - 18 18 - 22	ISO 12058-1
Pot life,[1] min @ 64°F @ 77°F @ 104°F	 280 - 320 110 - 160 45 - 55	Tecam, 100 mL, 65 % RH
Gel time,[2] min @ 77°F @ 104°F @ 140°F @ 176°F @ 212°F @ 248°F	 420 - 500 150 - 170 40 - 55 14 - 17 4 - 6 2 - 3	Hot Plate
Gelation @ 23°C, h	Start: 5 - 6.5 End: 7 - 8	Thin layers 0.4 - 0.7 mm
Typical cure cycles[3]	1 day 23 °C + 15 h 50 °C or 1 day 23 °C + 4 h 100 °C	

[1] A long pot life allows for ample time to produce even large objects.

[2]It must be noted that the values shown are for small amounts of pure resin/hardener mix. In composite structures the gel time can differ significantly from the given values depending on the fibre content and the laminate thickness.
[3]The optimum cure cycle has to be determined case by case, depending on the processing and the economic requirements.

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.

Properties of cured, neat Formulation

Property	Value		Test Method
Glass transition temperature,[1] T_g,°F Cure:	T_g onset	T_g	IEC 1006, 10 K/min
2 days 78°F	122 - 126	126 - 131	
8 days 78°F	140 - 147	144 - 151	
4 month 73°F	147 - 154	153 - 160	
1 day 73°F + 10 h 104°F	154 - 162	158 - 169	
1 day 73°F + 20 h 104°F	162 - 169	166 - 176	
1 day 73°F + 10 h 122°F	172 - 180	176 - 185	
1 day 73°F + 15 h 122°F	178 - 185	180 - 190	
1 day 73°F + 10 h 140°F	198 - 205	201 - 219	
1 day 73°F + 15 h 140°F	201 - 208	205 - 223	
1 day 73°F + 2 h 176°F	223 - 230	226 - 237	
1 day 73°F + 8 h 176°F	234 - 241	237 - 252	
1 day 73°F + 1 h 194°F	219 - 226	226 - 244	
1 day 73°F + 4 h 194°F	234 - 241	241 - 259	
1 day 73°F + 1 h 212°F	241 - 248	244 - 266	
1 day 73°F + 4 h 212°F	244 - 255	248 - 273	
4 months 73 °F + 4 h 266°F*	223 - 234	248 - 270	
Flexural strength, kpsi, Cure:			ISO 178
15 h 122°F	18.9 - 20.3		
8 h 176°F	16.8 - 17.7		
Elongation at flexural strength, %			ISO 178
15 h 122°F	5.8 - 6.3		
8 h 176°F	6.5 - 7.2		
Ultimate flexural strength, kpsi			ISO 178
15 h 122°F	13.1 - 16.7		
8 h 176°F	12.6 - 16.4		
Ultimate flexural elongation, %			ISO 178
15 h 122°F	8.0 - 9.5		
8 h 176°F	8.5 - 13.4		

Flexural modulus, kpsi 15 h 122°F 8 h 176°F	 435 - 479 392 - 435		ISO 178
Tensile strength, kpsi 7 days RT 15 h 122°F 8 h 176°F	 7.1 - 10.3 11.9 - 12.5 12.2 - 12.5		ISO 527
Elongation at tensile strength, % 7 days RT 15 h 122°F 8 h 176°F	 1.5 - 2.5 3.1 - 3.7 5.7 - 5.9		ISO 527
Ultimate tensile strength, kpsi 7 days RT 15 h 122°F 8 h 176°F	 7.1 - 10.3 11.6 - 12.0 11.6 - 12.2		ISO 527
Ultimate tensile elongation, % 7 days RT 15 h 122°F 8 h 176°F	 1.5 - 2.5 3.5 - 5.5 7.0 - 8.5		ISO 527
Tensile modulus , kpsi 7 days RT 15 h 122°F 8 h 176°F	 486 - 515 500 - 529 435 - 464		ISO 527
Fracture properties / Bend Notch Test Cure: 8 h 176°F Fracture toughness K_{IC}, psi·in$^{1/2}$ Fracture energy G_{IC}, in·lb/in^2	 846 -912 1.09 - 1.21		ISO 13586
Water absorption, immersion, % wt. 4 days H_2O 23°C 10 days H_2O 23°C 30 min H_2O 100°C 60 min H_2O 100°C	Cure: 7 days RT 0.45 - 0.50 0.70 - 0.80 0.55 - 0.60 0.70 - 0.80	Cure: 8 h 176°F 0.40 - 0.45 0.65 - 0.70 0.45 - 0.50 0.60 - 0.70	ISO 62
Coefficient of linear thermal expansion, 10^{-6}/°F mean from 20 - 50°C (Cure 7 d RT) mean from 20 - 90°C (Cure 15 h 122°F) mean from 20 - 120°C (Cure 8 h 176°F)	 54 39 39		DIN 53 752
Poisson's Ratio	0.35		

[1]The maximum attainable glass - transition temperature for this system is in the range of 266°F
*Even if post-cured at elevated temperature after a prolonged cure at ambient, a good increase of the glass transition temperature is obtained with this cure.

Properties of cured, Reinforced Formulation

Property	Value	Test Method
Flexural strength,[1] kpsi		ISO 178
Unconditioned	63.8 - 71.1	
After 30 days in H_2O 73°F	55.1 - 58.0	
Elongation at flexural strength, %		ISO 178
Unconditioned	2.7 - 3.0	
After 30 days in H_2O 73°F	2.7 - 3.0	
Ultimate flexural strength, kpsi		ISO 178
Unconditioned	60.9 - 66.7	
After 30 days in H_2O 73°F	49.3 - 53.7	
Ultimate flexural elongation, %		ISO 178
Unconditioned	2.9 - 3.2	
After 30 days in H_2O 73°F	1.9 - 3.4	
Flexural modulus, kpsi		ISO 178
Unconditioned	2900 - 3190	
After 30 days in H_2O 73°F	2755 - 3045	
Tensile strength,[1] kpsi	52.2 - 56.6	ISO 527
Ultimate tensile elongation, %	1.6 - 1.9	ISO 527
Tensile modulus, kpsi	4800 - 5670	ISO 527
Interlaminar shear strength,[2] kpsi		ASTM D 2344
Unconditioned (Cure: 7 days RT)	8. 35 - 8.8	
Unconditioned (Cure: 8 h 80 °C)	8.7 - 9.4	
After 1 h in H_2O 100 °C (7 days RT	8.0 - 8.7	
After 1 h in H_2O 100 °C (Cure: 8 h 80 °C)	8.4 - 9.0	

[1]Samples for flexural and tensile tests: 16 layers (4 mm) E-glass fabric 1:1, 280-300 g/m^2; Fiber volume content: 45 - 46%; Cure: 10 h at 176°F.

[2]Short beam interlaminar shear strength samples: E-glass unidirectional specimen, thickness t = 3.2 mm; Fiber volume content: 60%.

Storage

Araldite® LY 5052 Resin should be stored in a dry place, in the sealed original container, away from heat and humidity, at temperatures between 2°C and 40°C (35.6°F and 104°F). Under these storage conditions, the shelf life is **3 years** (from date of manufacture). The product should not be exposed to direct sunlight.

Aradur® 5052 Hardener should be stored in a dry place, in the sealed original container, away from heat and humidity, at temperatures between 2°C and 40°C (35.6°F and 104°F). Under these storage conditions, the shelf life is **3 years** (from date of manufacture). The product should not be exposed to direct sunlight.

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First Aid!
Refer to SDS as mentioned above.

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