

Advanced Materials**Araldite® LY 5150* / Aradur® 5021* / Hardener XB 3471*****PREPREG SYSTEM**

Araldite® LY 5150

Aradur® 5021 (hardener paste)

Hardener XB 3471 (based on polyamine)

APPLICATIONS	<ul style="list-style-type: none"> Industrial composites Recreational composites 																																																			
PROPERTIES	<ul style="list-style-type: none"> High-Tg prepreg system with long shelf life Very efficient chemical B-staging at 80-100 °C 																																																			
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KEY DATA	<table border="1"> <thead> <tr> <th colspan="3">Araldite® LY 5150</th> </tr> </thead> <tbody> <tr> <td>Aspect (visual)</td> <td colspan="2">light yellow, highly viscous liquid</td> </tr> <tr> <td>Viscosity at 25 °C (ISO 12058-1)</td> <td>380000 - 530000</td> <td>[mPa s]</td> </tr> <tr> <td>Density at 25 °C (ISO 1675)</td> <td>1.15 - 1.20</td> <td>[g/cm³]</td> </tr> <tr> <td>Flash point (ISO 2719)</td> <td>≥ 150</td> <td>[°C]</td> </tr> <tr> <td>Storage temperature (see expiry date on original container)</td> <td>2 - 40</td> <td>[°C]</td> </tr> <tr> <th colspan="3">Aradur® 5021</th> </tr> <tr> <td>Aspect (visual)</td> <td colspan="2">white viscous liquid</td> </tr> <tr> <td>Viscosity at 25 °C</td> <td>70000 - 90000</td> <td></td> </tr> <tr> <td>Density at 25 °C (ISO 1675)</td> <td>1.0</td> <td>[g/cm³]</td> </tr> <tr> <td>Flash point (ISO 2719)</td> <td>≥ 100</td> <td>[°C]</td> </tr> <tr> <td>Storage temperature (see expiry date on original container)</td> <td>< 8</td> <td>[°C]</td> </tr> <tr> <th colspan="3">Hardener XB 3471</th> </tr> <tr> <td>Aspect (visual)</td> <td colspan="2">transparent liquid</td> </tr> <tr> <td>Density at 25 °C (ISO 1675)</td> <td>1.0</td> <td>[g/cm³]</td> </tr> <tr> <td>Flash point (ISO 2719)</td> <td>≥ 100</td> <td>[°C]</td> </tr> <tr> <td>Storage temperature (see expiry date on original container)</td> <td>2 - 40</td> <td>[°C]</td> </tr> </tbody> </table>	Araldite® LY 5150			Aspect (visual)	light yellow, highly viscous liquid		Viscosity at 25 °C (ISO 12058-1)	380000 - 530000	[mPa s]	Density at 25 °C (ISO 1675)	1.15 - 1.20	[g/cm ³]	Flash point (ISO 2719)	≥ 150	[°C]	Storage temperature (see expiry date on original container)	2 - 40	[°C]	Aradur® 5021			Aspect (visual)	white viscous liquid		Viscosity at 25 °C	70000 - 90000		Density at 25 °C (ISO 1675)	1.0	[g/cm ³]	Flash point (ISO 2719)	≥ 100	[°C]	Storage temperature (see expiry date on original container)	< 8	[°C]	Hardener XB 3471			Aspect (visual)	transparent liquid		Density at 25 °C (ISO 1675)	1.0	[g/cm ³]	Flash point (ISO 2719)	≥ 100	[°C]	Storage temperature (see expiry date on original container)	2 - 40	[°C]
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STORAGE	<p>Provided that the products described above are stored in a dry place in their original, properly closed containers at the above mentioned storage temperatures they will have the shelf lives indicated on the labels.</p> <p>Partly emptied containers should be closed immediately after use.</p>																																																			

* In addition to the brand name product denomination may show different appendices, which allows us to differentiate between our production sites: e.g. BD = Germany, US = United States, IN = India, CI = China, etc. These appendices are in use on packaging, transport and invoicing documents. Generally the same specifications apply for all versions. Please address any additional need for clarification to the appropriate Huntsman contact.

PROCESSING DATA

MIX RATIO	<i>Components</i>	<i>Parts by weight</i>	<i>Parts by volume</i>
	Araldite [®] LY 5150	100	100
	Aradur [®] 5021	12	14
	Hardener XB 3471	4	5

Preheat the Epoxy Resin LY 5150 to 40-50 °C, add the Aradur[®] 5021 (20-25 °C) and stir slowly with a mixer to a homogeneous emulsion. At the end add the Hardener XB 3471 into the premix (30-40 °C) and stir slowly to obtain a homogeneous emulsion.

The prepreg tackiness is adjustable by the amount of hardener XB 3471.

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.

INITIAL MIX VISCOSITY (CONE-PLATE VISCOMETER)	[°C]	[mPa s]
	at 30	45000-50000
	at 50	3200-4000

POT LIFE (TECAM, 100 ML, 65 % RH)	[°C]	[h]
	at 30	7-9
	at 50	> 70

GEL TIME AFTER B-STAGE (HOT PLATE)	[°C]	[min]
	at 100	46-55
	at 110	28-34
	at 120	13-19
	at 130	6-10
	at 140	3-6

TYPICAL CURE CYCLES	30 min 130 °C or 60 min 130 °C or 30 min 140 °C or 30 min 120 °C + 30 min 140 °C
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The optimum cure cycle has to be determined case by case depending on the processing and the economic requirements.

PREPREG PRODUCTION	Impregnation bath temperature B-Stage (pre reaction)	40 - 50 °C 1 - 3 min at 80 - 90 °C
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Prepreg usable after 1 day at 22 - 28 °C

PREPREG SHELF LIFE	at 23 °C at 30 °C	6 - 8 weeks 3 - 4 weeks
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PROPERTIES OF THE CURED, NEAT FORMULATION

GLASS TRANSITION TEMPERATURE (T_G) (IEC 1006, DSC, 10 K/MIN)	<i>Cure: after B-Stage</i> 2 h 110 °C 1 h 120 °C 30 min 130 °C 1 h 130 °C 15 min 140 °C 30 min 140 °C 1 h 140 °C 15 min 150 °C 30 min 150 °C		T_G [°C] 113 - 122 125 - 134 127 - 136 135 - 145 134 - 144 135 - 145 135 - 145 128 - 136 136 - 146
FLEXURAL TEST (ISO 178)	Flexural strength Ultimate elongation Tensile modulus	<i>Cure:</i> [MPa] [%] [MPa]	<i>1 h 140 °C</i> 148 - 162 4.8 - 6.3 3500 - 3700
TENSILE TEST (ISO 527)	Tensile strength Ultimate elongation Tensile modulus	<i>Cure:</i> [MPa] [%] [MPa]	<i>1 h 140 °C</i> 68 - 78 2.0 - 3.0 3520 - 3620
FRACTURE PROPERTIES BEND NOTCH TEST (PM 258-0/90)	Fracture toughness K_{1C} Fracture energy G_{1C}	[MPa \sqrt{m}] [J/m 2]	<i>1 h 140 °C</i> 0.70 - 0.78 120 - 140
WATER ABSORPTION (ISO 62)	<i>Immersion</i> 1 h H $_2$ O 100 °C	<i>Cure:</i> [%]	<i>1 h 140 °C</i> 0.52 - 0.58

PROPERTIES OF THE CURED, REINFORCED FORMULATION

Samples:			
<ul style="list-style-type: none"> • 12 layers of unidirectional E-glass fabric (425 g/m2) • Laminate thickness: 3.1 - 3.3 mm • Cure: 1 h 140 °C 			
Interlaminar shear test (ASTM D 2344)	Shear strength	[MPa]	42 - 47
Flexural test (ISO 178)	Flexural strength Ultimate elongation Tensile modulus	[MPa] [%] [MPa]	850 - 1000 2.0 - 2.8 27500 - 30500
Torsional test (ISO 6721, DMA, 2 K/min)	Samples:		
<ul style="list-style-type: none"> • 4 layers of unidirectional E-glass fabric (425 g/m2) • Cure: 1 h 140 °C 			
	T_G	[°C]	155 - 160

**HANDLING
PRECAUTIONS****Personal hygiene**

Safety precautions at workplace

protective clothing	yes
gloves	essential
arm protectors	recommended when skin contact 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

Disposal of spillage

Soak up with sawdust or cotton waste and deposit in plastic-lined bin

Ventilation

of workshop	Renew air 3 to 5 times an hour
of workplaces	Exhaust fans. Operatives should avoid inhaling vapours

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* vapours should be moved out of doors immediately.

In all cases of doubt call for medical assistance.

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