

Advanced Materials**Araldite® LY 1564 SP* / Hardener XB 3416*****WARM CURING EPOXY SYSTEM**

Araldite® LY 1564 SP
Hardener XB 3416 (formulated amine hardener)

APPLICATIONS	Industrial composites Specially made for Wind Mill Blades		
PROPERTIES	Laminating system with low viscosity and high flexibility. The long pot life of XB 3416 facilitates the production of very large industrial parts. The systems are qualified by Germanischer Lloyd.		
PROCESSING	<ul style="list-style-type: none"> • Resin Transfer Moulding (RTM, SCRIMP) • Wet lay-up • Filament Winding 		
KEY DATA	Araldite® LY 1564 SP		
	Aspect (visual)	clear liquid	
	Colour (Gardner, ISO 4630)	1-2	
	Viscosity at 25 °C (ISO 12058-1B)	1200 - 1400	[mPa s]
	Density at 25 °C (ISO 1675)	1.1 - 1.2	[g/cm ³]
	Flash point (ISO 2719)	185	[°C]
	Storage temperature (see expiry date on original container)	2 - 40	[°C]
	Hardener XB 3416		
	Aspect (visual)	clear colourless to slightly yellow liquid	
	Viscosity at 25 °C (ISO 12058-1B)	15 - 55	[mPa s]
	Density at 25 °C (ISO 1675)	0.97 - 1,02	[g/cm ³]
	Flash point (ISO 2719)	> 120	[°C]
	Storage temperature (see expiry date on original container)	2 - 40	[°C]
STORAGE	<p>Provided that Araldite® LY 1564 SP and Hardener XB 3416 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, Cl = 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 1564 SP	100	100
	Hardener XB 3416	34	41

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.

INITIAL MIX VISCOSITY (HOEPLER, ISO 12058-1B)		[°C]	[mPa s]
	LY 1564 SP /XB 3416	at 25	200 - 320

POT LIFE (TECAM, 23°C, 65 % RH)		[g]	[min]
	LY 1564 /XB 3416	100	290 - 340

GEL TIME (HOT PLATE)		[°C]	[min]
	LY 1564 SP /XB 3416	at 60	70 - 90
		at 80	20 - 27
		at 100	7 - 12
		at 120	2 - 6

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.

PROPERTIES OF THE CURED, NEAT FORMULATION

GLASS TRANSITION TEMPERATURE (IEC 1006, DSC, 10 K/MIN)	<i>Cure:</i>	T_G	<i>LY 1564 SP XB 3416</i>		
	2 days 23 °C	[°C]	40 - 46		
	8 days 23 °C	[°C]	51 - 57		
	20 h 40 °C	[°C]	61 - 67		
	15 h 50 °C	[°C]	68 - 73		
	24 h 50 °C	[°C]	69 - 75		
	10 h 60 °C	[°C]	70 - 75		
	16 h 60 °C	[°C]	72 - 78		
	4 h 80 °C	[°C]	78 - 83		
	8 h 80 °C	[°C]	80 - 85		
	2 h 100 °C	[°C]	80 - 85		
	5 h 100 °C	[°C]	81 - 87		
TENSILE TEST (ISO 527)	<i>LY 1564 SP / XB 3416</i>		<i>Cure:</i> 15 h 50 °C	<i>Cure:</i> 8 h 80 °C	
	Tensile strength	[MPa]	74 - 78	70 - 75	
	Elongation at tensile strength	[%]	4.0 - 4.4	4.5 - 5.0	
	Ultimate strength	[MPa]	59 - 66	60 - 64	
	Ultimate elongation	[%]	7.0 - 7.8	8.0 - 9.0	
	Tensile modulus	[MPa]	3100 - 3300	2870 - 3050	
FLEXURAL TEST (ISO 178)	<i>LY 1564 SP / XB 3416</i>		<i>Cure:</i> 7 days 23 °C	<i>Cure:</i> 15 h 50 °C	<i>Cure:</i> 8 h 80 °C
	Flexural strength	[MPa]	95 - 110	120 - 135	118 - 130
	Elongation at flexural strength	[%]	2.7 - 3.6	5.2 - 5.6	5.5 - 6.5
	Ultimate strength	[MPa]	95 - 110	84 - 94	88 - 100
	Ultimate elongation	[%]	2.7 - 3.6	9.0 - 11.0	10.0 - 12.0
	Flexural modulus	[MPa]	3470 - 3670	3100 - 3400	2900 - 3050
FRACTURE PROPERTIES			<i>Cure: 5 h 100 °C</i>		
BEND NOTCH TEST (PM 258-0/90)	Fracture toughness K_{1C}	[MPa√m]	<i>LY 1564 SP XB 3416</i>		
	Fracture energy G_{1C}	[J/m ²]	0.95 - 1.05		
			260 - 310		

PROPERTIES OF THE CURED, REINFORCED FORMULATION

INTERLAMINAR SHEAR TEST (ASTM D 2344)	Short beam: Laminate comprising 12 layers unidirectional E-glass fabric (425 g/m ²) Laminate thickness t = 3.0 - 3.2 mm Fibre volume content: 63 - 65 %		<i>Cure: 1.5 h 80 °C + 5 h 100 °C</i>	<i>LY 1564 SP XB 3416</i>
	Shear strength	[MPa]		53 - 58

**HANDLING
PRECAUTIONS****Personal hygiene***Safety precautions at workplace*

protective clothing	yes
gloves	essential
arm protectors	recommended when skin contact likely
<u>goggles/safety glasses</u>	<u>yes</u>

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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