

Advance Materials

STRUCTURAL COMPOSITES

DATA SHEET

Warm-curing epoxy system based on Araldite® LY 1564 / Hardener XB 3485*																																		
Araldite LY 1564 (Epoxid based resin) Hardener XB 3485 (formulated amine hardener)																																		
Applications	Industrial composites (Windmill Blades)																																	
Properties	Laminating system with low viscosity and high flexibility. The long pot life of XB 3485 facilitates the production of very large industrial parts.																																	
Processing	Resin Transfer Moulding (RTM, Infusion) Filament Winding Wet lay-up																																	
Key data	<p>Araldite LY 1564</p> <table border="1"> <tr> <td>Aspect (visual)</td> <td>clear liquid</td> <td></td> </tr> <tr> <td>Colour (Gardner, ISO 4630)</td> <td>1-2</td> <td></td> </tr> <tr> <td>Viscosity at 25 °C (ISO 9371B)</td> <td>1200 - 1400</td> <td>[mPa s]</td> </tr> <tr> <td>Density at 25 °C (ISO 1675)</td> <td>1.1 - 1.2</td> <td>[g/cm³]</td> </tr> <tr> <td>Flash point (ISO 2719)</td> <td>185</td> <td>[°C]</td> </tr> <tr> <td>Storage temperature (see expiry date on original container)</td> <td>2 - 40</td> <td>[°C]</td> </tr> </table> <p>Hardener XB 3485</p> <table border="1"> <tr> <td>Aspect (visual)</td> <td>clear colourless to slightly yellow liquid</td> <td></td> </tr> <tr> <td>Viscosity at 25 °C (ISO 9371B)</td> <td>10 - 30</td> <td>[mPa s]</td> </tr> <tr> <td>Density at 25 °C (ISO 1675)</td> <td>0,94 – 0,97</td> <td>[g/cm³]</td> </tr> <tr> <td>Flash point (ISO 2719)</td> <td>> 122</td> <td>[°C]</td> </tr> <tr> <td>Storage temperature (see expiry date on original container)</td> <td>2 - 40</td> <td>[°C]</td> </tr> </table>	Aspect (visual)	clear liquid		Colour (Gardner, ISO 4630)	1-2		Viscosity at 25 °C (ISO 9371B)	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]	Aspect (visual)	clear colourless to slightly yellow liquid		Viscosity at 25 °C (ISO 9371B)	10 - 30	[mPa s]	Density at 25 °C (ISO 1675)	0,94 – 0,97	[g/cm ³]	Flash point (ISO 2719)	> 122	[°C]	Storage temperature (see expiry date on original container)	2 - 40	[°C]
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Storage	<p>Provided that Araldite LY 1564 and Hardener XB 3485 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 1564	100	100
	Hardener XB 3485	37	44
<p>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.</p> <p>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.</p>			
Initial mix viscosity (Hoeppler, ISO 9371B)	LY 1564 /XB 3485	<i>[°C]</i>	<i>[mPa s]</i>
		at 25	200 - 320
Pot life (Tecam, 23°C, 65 % RH)	LY 1564 /XB 3485	<i>[g]</i>	<i>[min]</i>
		100	970 - 1050
		1000	190 - 260
Gel time (Hot plate)	LY 1564 /XB 3485	<i>[°C]</i>	<i>[min]</i>
		at 60	110 - 140
		at 80	40 - 55
		at 100	15 - 20
		at 120	6 - 10
<p>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.</p>			

Properties of the cured, neat formulation

Glass transition temperature (IEC 1006, DSC, 10 K/min)	<i>Cure:</i>	T_G	<i>LY 1564 XB 3485</i>		
	2 days 23 °C	[°C]	36 - 43		
	8 days 23°C	[°C]	48 - 55		
	20 h 40°C	[°C]	53 - 60		
	15 h 50°C	[°C]	60 - 72		
	24 h 50°C	[°C]	64 - 72		
	10 h 60°C	[°C]	65 - 73		
	16 h 60°C	[°C]	74 - 80		
	4 h 80°C	[°C]	76 - 83		
	8 h 80 °C	[°C]	80 - 88		
	2 h 100°C	[°C]	80 - 87		
	5 h 100 °C	[°C]	83 - 90		
Tensile test (ISO 527)	<i>LY 1564 / XB 3485</i>		<i>Cure:</i> 15 h 50 °C	<i>Cure:</i> 8 h 80 °C	
	Tensile strength	[MPa]	70 - 78	65 - 74	
	Elongation at tensile strength	[%]	3.5 - 4.0	4.5 - 5.3	
	Ultimate strength	[MPa]	59 - 66	54 - 63	
	Ultimate elongation	[%]	5.0 - 6.0	9.0 - 10.0	
	Tensile modulus	[MPa]	3000 - 3300	2800 - 3100	
Flexural test (ISO 178)	<i>LY 1564 / XB 3485</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]	90 - 105	120 - 135	110 - 125
	Elongation at flexural strength	[%]	2.5 - 3.5	4.5 - 5.5	5.5 - 6.5
	Ultimate strength	[MPa]	95 - 105	72 - 80	90 - 110
	Ultimate elongation	[%]	2.5 - 3.5	8.5 - 10.0	9.0 - 10.5
	Flexural modulus	[MPa]	3250 - 3500	3100 - 3300	2800 - 3000
Fracture properties Bend notch test (PM 258-0/90)	<i>LY 1564 / XB 3485</i>		<i>Cure:</i> 15 h 50°C	<i>Cure:</i> 8 h 80°C	
	Fracture toughness K_{1C}	[MPa√m]	0.90 - 0.98	1.15 - 1.30	
	Fracture energy G_{1C}	[J/m ²]	200 - 260	400 - 480	

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>LY 1564P / XB 3485</i>		<i>Cure: 1.5 h 80 °C + 5 h 100 °C</i>	
		[MPa]		
	Shear strength		52 - 58	

Handling precautions Mandatory and recommended industrial hygiene procedures should be followed whenever our products are being handled and processed. For additional information please consult the corresponding product safety data sheets and the brochure “Hygienic precautions for handling plastics products”

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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