Advanced Materials

Structural Composites

HUNTSMAN

DATA SHEET

Warm-curing epoxy system based on Araldite® LY 1564 SP* / Hardener XB 3486* / Hardener XB 3487*

Araldite LY 1564 SP
Hardener XB 3486 (formulated amine hardener)
Hardener XB 3487 (formulated amine hardener)

Applications

Industrial composites

Properties

Laminating system with low viscosity and high flexibility. The reactivity may easily be adjusted to demands through the combination of both hardeners. The long pot life of XB 3486 facilitates the production of very large industrial parts. The systems are qualified by Germanischer Lloyd.

Processing

- 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 12058-1)	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 3486

Aspect (visual)	clear colourless to slightly yellow liquid	
Viscosity at 25 °C (ISO 12058-1)	10 - 20	[mPa s]
Density at 25 °C (ISO 1675)	0.94 - 0,95	[g/cm^3]
Flash point (ISO 2719)	123	[°C]
Storage temperature (see expiry date on original container)	2 - 40	[°C]

Hardener XB 3487

Aspect (visual)	clear colourless to slightly yellow liquid	
Viscosity at 25 °C (ISO 12058-1B)	30 - 70	[mPa s]
Density at 25 °C (ISO 1675)	0,98 - 1,0	[g/cm^3]
Flash point (ISO 2719)	122 - 124	[°C]
Storage temperature (see expiry date on original container)	2 - 40	[°C]

Storage

Provided that Araldite LY 1564 SP and Hardener XB 3486 or XB 3487 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.
Partly emptied containers should be closed immediately after use.

* *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

Components	*Parts by weight*	*Parts by volume*
Araldite LY 1564 SP	100	100
Hardener XB 3486	34	41
Araldite LY 1564 SP	100	100
Hardener XB 3487	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		*[°C]*	*[mPa s]*
(Hoeppler, ISO 12058-1B)	LY 1564 SP /XB 3486	at 25	200 - 300
	LY 1564 SP /XB 3487	at 25	220 - 320

Pot life		*[g]*	*[min]*
(Tecam, 23°C, 65 % RH)	LY 1564 SP /XB 3486	100	560 - 620
		1000	180 - 230
	LY 1564 SP /XB 3487	100	130 - 160
		1000	75 - 100

Gel time		*[°C]*	*[min]*
(Hot plate)	LY 1564 SP /XB 3486	at 60	110 - 130
		at 80	33 - 43
		at 100	13 - 17
		at 120	5 - 9
	LY 1564 SP /XB 3487	at 60	65 - 85
		at 80	18 - 25
		at 100	6 - 10
		at 120	2 - 5

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.

Combination of the hardeners

Araldite LY 1564 SP	100	100	100	100	100
Hardener XB 3486		8.5	17	25.5	34
Hardener XB 3487	34	25.5	17	8.5	
Pot Life (Tecam at 23 °C)	*[min]*	*[min]*	*[min]*	*[min]*	*[min]*
100g	130 - 170	290 - 340	380 - 430	530 - 590	560 - 620
Gel time (Hot plate)	*[min]*	*[min]*	*[min]*	*[min]*	*[min]*
at 80 °C	18 - 25	20 - 27	25 - 33	30 - 39	33 - 43
at 100 °C	6 - 10	7 - 11	9 - 13	11 - 15	13 - 17

Properties of the cured, neat formulation

Glass transition temperature	*Cure:*	T_G	*LY 1564 XB 3487*	*LY 1564 XB 3486*
(IEC 1006, DSC, 10 K/min)	2 days 23 °C	[°C]	42 - 48	33 - 37
	8 days 23 °C	[°C]	54 - 59	49 - 53
	20 h 40 °C	[°C]	63 - 68	52 - 56
	15 h 50 °C	[°C]	68 - 73	66 - 70
	24 h 50 °C	[°C]	71 - 75	66 - 70
	10 h 60 °C	[°C]	72 - 76	67 - 71
	16 h 60 °C	[°C]	75 - 80	68 - 72
	4 h 80 °C	[°C]	81 - 86	77 - 81
	8 h 80 °C	[°C]	81 - 86	80 - 84
	2 h 100 °C	[°C]	81 - 86	78 - 82
	5 h 100 °C	[°C]	82 - 86	80 - 84

Tensile test (ISO 527)	*LY 1564 SP / XB 3487*		*Cure: 15 h 50 °C*	*Cure: 8 h 80 °C*
	Tensile strength	[MPa]	77 - 81	72 - 76
	Elongation at tensile strength	[%]	3.9 - 4.1	4.5 - 4.9
	Ultimate strength	[MPa]	58 - 64	63 - 68
	Ultimate elongation	[%]	7.2 - 8.0	8.0 - 9.0
	Tensile modulus	[MPa]	3200 - 3350	2940 - 3100

Tensile test (ISO 527)	*LY 1564 SP / XB 3486*		*Cure: 15 h 50 °C*	*Cure: 8 h 80 °C*
	Tensile strength	[MPa]	74 - 78	70 - 74
	Elongation at tensile strength	[%]	4.0 - 4.2	4.6 - 5.0
	Ultimate strength	[MPa]	62 - 68	60 - 64
	Ultimate elongation	[%]	5.8 - 6,2	8.0 - 8.5
	Tensile modulus	[MPa]	3100 - 3250	2860 - 3000

Flexural test (ISO 178)	*LY 1564 SP / XB 3487*		*Cure: 7 days 23 °C*	*Cure: 15 h 50 °C*	*Cure: 8 h 80 °C*
	Flexural strength	[MPa]	98 - 112	125 - 138	118 - 130
	Elongation at flexural strength	[%]	2.7 - 3.6	5.0 - 5.4	5.5 - 6.5
	Ultimate strength	[MPa]	98 - 112	88 - 95	88 - 100
	Ultimate elongation	[%]	2.7 - 3.6	8.2 - 10.0	10.0 - 12.0
	Flexural modulus	[MPa]	3460 - 3660	3200 - 3400	2950 - 3100

Flexural test (ISO 178)	*LY 1564 SP / XB 3486*		*Cure: 7 days 23 °C*	*Cure: 15 h 50 °C*	*Cure: 8 h 80 °C*
	Flexural strength	[MPa]	80 - 90	120 - 135	118 - 130
	Elongation at flexural strength	[%]	2.1 - 2.5	5.2 - 5.6	5.5 - 6.5
	Ultimate strength	[MPa]	80 - 90	78 - 85	88 - 100
	Ultimate elongation	[%]	2.1 - 2.5	9.0 - 11.5	10.5 - 12.5
	Flexural modulus	[MPa]	3500 - 3700	3100 - 3300	2900 - 3050

Fracture properties Bend notch test		*Cure: 5 h 100 °C*	*LY 1564 SP XB 3487*	*LY 1564 SP XB 3486*
(PM 258-0/90)	Fracture toughness K_{1C}	[MPa√m]	0.95 - 1.05	0.95 - 1.05
	Fracture energy G_{1C}	[J/m^2]	255 - 305	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 %

	Cure: 1.5 h 80 °C + 5 h 100 °C	*LY 1564 XB 3487*	*LY 1564 XB 3486*
Shear strength	[MPa]	53 - 58	53 - 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.

Note

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