

Warm-curing epoxy system based on Araldite® LY 1556 SP* / Hardener XB 3461* / Hardener XB 3464* / Hardener XB 3405*

Araldite LY 1556 SP (epoxy resin)
Hardener XB 3461 (amine hardener)
Hardener XB 3464 (amine hardener)
Hardener XB 3405 (amine hardener)

Applications	Industrial composites		
Properties	Laminating system with high flexibility. The reactivity may easily be adjusted to demands through the combination of the different hardeners. The long pot life of XB 3461 facilitates the production of very large industrial parts. The systems are qualified by Germanischer Lloyd.		
Processing	<ul style="list-style-type: none"> Wet lay-up Resin Transfer Moulding (RTM, SCRIMP) Filament Winding 		
Key data	Araldite LY 1556 SP		
	Aspect (visual)	clear liquid	
	Viscosity at 25 °C (ISO 9371B)	10000-12000	[mPa s]
	Density at 25 °C (ISO 1675)	1.15-1.2	[g/cm ³]
	Hardener XB 3461		
	Aspect (visual)	clear yellow to brown liquid	
	Viscosity at 25 °C (ISO 9371B)	30-70	[mPa s]
	Density at 25 °C (ISO 1675)	0.9-1.0	[g/cm ³]
	Flash point (ISO 2719)	> 110	[°C]
	Hardener XB 3464		
	Aspect (visual)	clear blue liquid	
	Viscosity at 25 °C (ISO 9371B)	15-35	[mPa s]
	Density at 25 °C (ISO 1675)	0.9-1.0	[g/cm ³]
	Flash point (ISO 2719)	120	[°C]
	Hardener XB 3405		
	Aspect (visual)	clear red liquid	
Viscosity at 25 °C (ISO 9371B)	70-90	[mPa s]	
Density at 25 °C (ISO 1675)	0.95-1.0	[g/cm ³]	
Flash point (ISO 2719)	109	[°C]	
Storage temperature (see expiry date on original container)	2-40	[°C]	
Storage	<p>Provided that Araldite LY 1556 and Hardeners XB 3461 / XB 3464 or XB 3405 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, 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 1556 SP	100	100
	Hardener XB 3461	33	41
	Araldite LY 1556 SP	100	100
	Hardener XB 3464	33	41
	Araldite LY 1556 SP	100	100
	Hardener XB 3405	33	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.

Viscosity at 25 °C		<i>LY 1556 SP XB 3461</i>	<i>LY 1556 SP XB 3464</i>	<i>LY 1556 SP XB 3405</i>
	[mPas]	800-1100	700-1000	1500-1800
Pot life (Tecam 100 g)		<i>LY 1556 SP XB 3461</i>	<i>LY 1556 SP XB 3464</i>	<i>LY 1556 SP XB 3405</i>
	at 28 °C [min.]	320-360	180-220	40-50
Gel time (Hot plate)		<i>LY 1556 SP XB 3461</i>	<i>LY 1556 SP XB 3464</i>	<i>LY 1556 SP XB 3405</i>
	at 80 °C [min.]	30-34	23-27	6-9
Gelation at 28 °C (in thin layers: 0.4-0.7 mm)		<i>LY 1556 SP XB 3461</i>	<i>LY 1556 SP XB 3464</i>	<i>LY 1556 SP XB 3405</i>
	Start [min.]	450-490	400-440	200-260
	End [min.]	680-740	620-670	300-360

Properties of the cured, neat formulation

Glass transition temperature (IEC 1006, DSC, 10 K/min)	<i>Cure:</i>	T_G	<i>LY 1556 SP</i> <i>XB 3461</i>	<i>LY 1556 SP</i> <i>XB 3464</i>	<i>LY 1556 SP</i> <i>XB 3405</i>
	4h 60 °C + 6h 80 °C	[°C]	80-86	80-86	92-98
HDT (ISO 75)	4h 60 °C + 6h 80 °C	[°C]	74-78	72-76	80-85
Tensile test (ISO 527)	<i>Cure:</i> 4h 60 °C + 6h 80 °C		<i>LY 1556 SP</i> <i>XB 3461</i>	<i>LY 1556 SP</i> <i>XB 3464</i>	<i>LY 1556 SP</i> <i>XB 3405</i>
	Tensile strength	[MPa]	70-80	70-80	78-88
	Elongation at tensile strength	[%]	4-5	4-5	4.5-5.5
	Ultimate strength	[MPa]	55-65	55-65	70-80
	Ultimate elongation	[%]	7-9	7-9	8-10
	Tensile modulus	[MPa]	3000-3250	3100-3350	3200-3500
Flexural test (ISO 178)	<i>Cure:</i> 4h 60 °C + 6h 80 °C		<i>LY 1556 SP</i> <i>XB 3461</i>	<i>LY 1556 SP</i> <i>XB 3464</i>	<i>LY 1556 SP</i> <i>XB 3405</i>
	Flexural strength	[MPa]	120-130	115-125	130-145
	Elongation at flexural strength	[%]	5-6	5-6	6-7
	Ultimate strength	[MPa]	95-110	85-100	110-125
	Ultimate elongation	[%]	8.5-10.5	9-11	9-11
	Flexural modulus	[MPa]	2950-3200	2800-3100	3100-3400
Water absorption	<i>Cure:</i> 4h 60 °C + 6h 80 °C		<i>LY 1556 SP</i> <i>XB 3461</i>	<i>LY 1556 SP</i> <i>XB 3464</i>	<i>LY 1556 SP</i> <i>XB 3405</i>
	After 24 hours at 23 °C	[%]	0.12-0.16	0.12-0.16	0.13-0.17
	After 168 hours at 23 °C	[%]	0.35-0.39	0.35-0.39	0.37-0.41
Fracture properties	<i>Cure:</i> 4h 60 °C + 6h 80 °C		<i>LY 1556 SP</i> <i>XB 3461</i>	<i>LY 1556 SP</i> <i>XB 3464</i>	<i>LY 1556 SP</i> <i>XB 3405</i>
Bend notch test (PM 258-0/90)	Fracture toughness K_{1C}	[MPa√m]	0.75-0.90	0.75-0.90	0.65-0.80
	Fracture energy G_{1C}	[J/m ²]	175-205	175-205	130-170

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" (Publ. No. 24264/e).

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.

Vantico Ltd.
Advanced Materials
®Registered trademark



IMPORTANT: The following supersedes Buyer's documents. SELLER MAKES NO REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. No statements herein are to be construed as inducements to infringe any relevant patent. Under no circumstances shall Seller be liable for incidental, consequential or indirect damages for alleged negligence, breach of warranty, strict liability, tort or contract arising in connection with the product(s). Buyer's sole remedy and Seller's sole liability for any claims shall be Buyer's purchase price. Data and results are based on controlled or lab work and must be confirmed by Buyer by testing for its intended conditions of use. The product(s) has not been tested for, and is therefore not recommended for, uses for which prolonged contact with mucous membranes, abraded skin, or blood is intended; or for uses for which implantation within the human body is intended.