HUNTSMAN
Enriching lives through innovation

Advanced Materials

Araldite® LY 1564 / Araldite® LY 3585 / Aradur® 5003-1*

WARM CURING EPOXY SYSTEM

Araldite® LY 1564 is a low viscosity epoxy resin
Araldite® LY 3585 is an epoxy resin
Aradur® 5003-1 is a polyamine based hardener

APPLICATIONS	Industrial composites		
PROPERTIES	The system exhibits excellent mechanical properties and good thermal resistance Due to its high reactivity short cure cycles can be realized		
PROCESSING	Resin Transfer Moulding (RTM) Wet lay-up Pressure moulding		
PRODUCT DATA	**Araldite® LY 1564**		
	Aspect (visual)	clear liquid	
	Viscosity at 25 °C (ISO 12058-1)	1200 – 1400 **	[mPa s]
	Density at 25 °C (ISO 1675)	1.1 - 1.2	[g/cm^3]
	Epoxy index (ISO 3001)	5.8 - 6.05 **	[Eq/kg]
	Araldite® LY 3585		
	Aspect (visual)	clear liquid	
	Viscosity at 25 °C (ISO 12058-1)	6500 – 9000 **	[mPa.s]
	Density at 25 °C (ISO 1675)	1.15 - 1.20	[g/cm^3]
	Epoxide index (ISO 3001)	5.45 – 5.65**	[Eq/kg]
	Aradur® 5003-1		
	Aspect (visual)	clear light yellow liquid	
	Viscosity at 20 °C (ISO 2555)	160 – 250 **	[mPa s]
	Density at 25 °C (ISO 1675)	0,98 - 1,08	[g/cm^3]

*** Specified data are on a regular basis analysed. Data which is described in this document as 'typical' is not analysed on a regular basis and is given for information purposes only. Data values are not guaranteed or warranted unless if specifically mentioned.*

STORAGE

Provided that Araldite® LY 1564, Araldite® LY 3585 or Aradur® 5003-1 are stored in a dry place in their original, properly closed containers at the storage temperatures mentioned in the MSDS they will have the shelf lives indicated on the labels. Partly emptied containers should be closed immediately after use.
Araldite® LY 3585 which has crystallized and looks cloudy can be restored to its original state by heating to 60 - 80 °C.

* *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.*

TYPICAL SYSTEM DATA

PROCESSING DATA

MIX RATIO

Components	*Parts by weight*	*Parts by volume*
Araldite® LY 1564	100	100
Aradur® 5003-1	20	24
Araldite® LY 3585	100	100
Aradur® 5003-1	19	23

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 (CONE-PLATE VISCOSIMETER)

	[°C]	*[mPa s]*
LY 1564 / Aradur® 5003-1	at 25	800 - 900
LY 1564 / Aradur® 5003-1	at 40	200 - 260
LY 3585 / Aradur® 5003-1	at 40	440 - 500

POT LIFE (TECAM, 23°C, 65 % RH)

	[g]	*[min]*
LY 1564 / Aradur® 5003-1	100	42 - 52
LY 3585 / Aradur® 5003-1	100	40 - 48

GEL TIME (HOT PLATE)

	[°C]	*[min]*
LY 1564 / Aradur® 5003-1	at 60	21 - 27
	at 80	6 - 8
	at 100	2 - 3
LY 3585 / Aradur® 5003-1	at 60	20 - 26
	at 80	6 - 8
	at 100	2 - 3

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 (ISO 11357-2, DSC, 10 K/MIN)	*Cure:*	T_G	*LY 1564 Ar. 5003-1*	LY *3585 Ar. 5003-1*
	3 days 23 °C	[°C]	50 - 56	48 - 55
	4 h 60 °C	[°C]	76 - 82	80 - 86
	30 min 80 °C	[°C]	88 - 95	90 - 96
	2 h 80 °C	[°C]	95 - 102	100 - 110
	10 min 100 °C	[°C]	96 - 105	114 - 122
	1 h 100 °C	[°C]	105 - 112	115 - 122
	30 min 80 °C+2 h 120 °C	[°C]	108 - 115	120 - 130
TENSILE TEST (ISO 527)	*Cure:*		*LY 1564 Ar. 5003-1*	LY *3585 Ar. 5003-1*
	30 min. 80 °C + 2 h 120 °C			
	Tensile strength	[MPa]	55 - 65	58 - 68
	Elongation at tensile strength	[%]	2.8 – 3.8	2.6 – 3.6
	Ultimate strength	[MPa]	55 - 65	58 - 68
	Ultimate elongation	[%]	3 - 4	2.8 – 3.8
	Tensile modulus	[MPa]	2600 - 2900	2800 - 3100
FLEXURAL TEST (ISO 178)	*Cure:*		*LY 1564 Ar. 5003-1*	LY *3585 Ar. 5003-1*
	30 min. 80 °C + 2 h 120 °C			
	Flexural strength	[MPa]	108 - 118	115 - 125
	Elongation at flexural strength	[%]	6.0 – 7.5	5 - 7
	Ultimate strength	[MPa]	105 - 115	110 - 120
	Ultimate elongation	[%]	7 - 9	6 - 9
	Flexural modulus	[MPa]	2600 - 2900	2800 - 3100
FRACTURE PROPERTIES BEND NOTCH TEST (ISO 13586)	*Cure:*		*LY 1564 Ar. 5003-1*	LY *3585 Ar. 5003-1*
	30 min. 80 °C + 2 h 120 °C			
	Fracture toughness K_{1C}	[MPa√m]	0.9 - 1.0	0.8 - 0.9
	Fracture energy G_{1C}	[J/m^2]	230 - 290	180 - 230

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: *30 min 80 °C + 20 min 120 °C*	*LY 1564 Ar. 5003-1*	LY *3585 Ar. 5003-1*
Shear strength	[MPa]	52 - 56	62 - 67

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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