HUNTSMAN
Enriching lives through innovation

Advanced Materials

Araldite® LY 8615* / Aradur® 8615* / Hardener XB 5173*

HIGH TEMPERATURE EPOXY SYSTEM

Araldite® LY 8615 (epoxy resin)
Aradur® 8615 (amine hardener)
Hardener XB 5173 (amine hardener)

APPLICATIONS

Industrial composites

PROPERTIES

Araldite® LY 8615 / Aradur® 8615 or Hardener XB 5173 epoxy system is a two-component, low-viscosity material developed for production of advanced composite parts and moulds using vacuum-assisted resin transfer molding.

Composites produced with Araldite® LY 8615 / Aradur® 8615 / XB 5173 epoxy system can achieve a glass transition temperature of over 180°C following appropriate postcure and provide a long pot life.

PROCESSING

- Resin Transfer Moulding (RTM, SCRIMP, VARTM)

KEY DATA

Araldite® LY 8615		
Aspect (visual)	Liquid, brown	
Viscosity at 25 °C (ASTM D-792)	1300 - 1800	[mPa s]
Density at 25 °C (ASTM D-2393)	1.19 - 1.25	[g/cm^3]
Flash point (DIN 51758)	> 100	[°C]
Aradur® 8615		
Aspect (visual)	clear liquidLiquid	
Viscosity at 25 °C (ISO 12058-1)	70 - 120	[mPa s]
Density at 25 °C (ISO 1675)	0,93 - 0,95	[g/cm^3]
Flash point (DIN 51758)	139-142	[°C]
Amine value (ISO 9702)	8.30 - 8.50**	[Eq/kg]
Hardener XB 5173		
Aspect (visual)	clear liquid, pale yellow	
Viscosity at 25 °C (ISO 12058-1B)	10 - 40	[mPa s]
Density at 25 °C (ISO 1675)	0,91 - 1,93	[g/cm^3]
Flash point (DIN 51758)	108-112	[°C]
Amine value (ISO 9702)	10.70 - 11.0**	[Eq/kg]

STORAGE

Provided that Araldite® LY 8615 / Aradur® 8615 or Hardener XB 5173 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.

*** 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.*

* *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.*

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TYPICAL SYSTEM DATA

PROCESSING DATA

MIX RATIO

Components	*Parts by weight*	*Parts by volume*
Araldite® LY 8615	100	100
Aradur® 8615	50	65
Araldite® LY 8615	100	100
Hardener XB 5173	38	50

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
(HOEPPLER, ISO 9371B)

	[°C]	*[mPa s]*
Araldite® LY 8615 / Aradur® 8615	at 25	480 - 580
Araldite® LY 8615 / XB 5173	at 25	270 - 370
Araldite® LY 8615 / Aradur® 8615	at 40	80 - 160
Araldite® LY 8615 / XB 5173	at 40	60 - 140
Araldite® LY 8615 / Aradur® 8615	at 60	30 - 70
Araldite® LY 8615 / XB 5173	at 60	20 - 60

POT LIFE
(TECAM, 23°C, 65 % RH)

	[°C]	*[min]*
Araldite® LY 8615 / Aradur® 8615	at 23	850 - 980
Araldite® LY 8615 / XB 5173	at 23	300 - 400

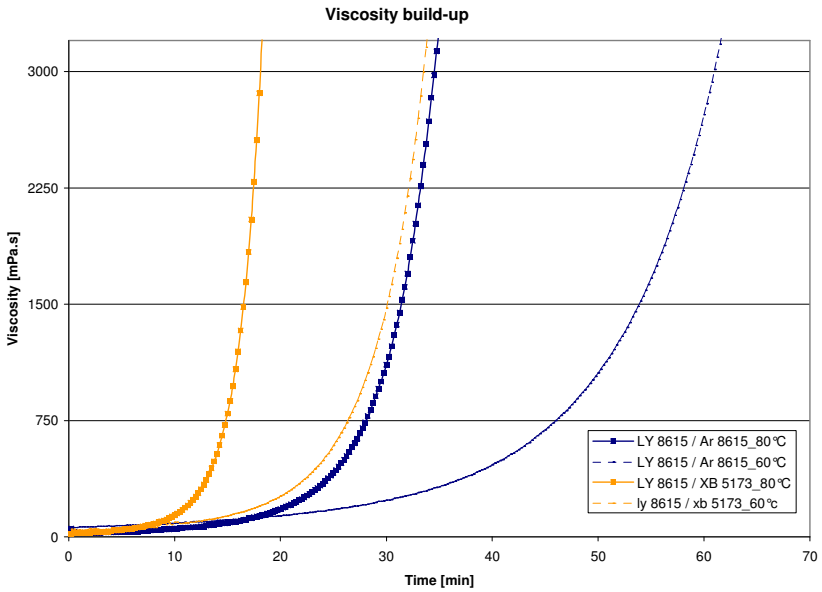
GEL TIME
(HOT PLATE)

	[°C]	*[min]*
Araldite® LY 8615 / Aradur® 8615	at 80	34 - 38
	at 100	16 - 20
	at 120	7 -11
	at 140	3 - 5
Araldite® LY 8615 / XB 5173	at 80	24 - 28
	at 100	8 - 12
	at 120	2 - 6
	at 140	1 - 3

VISCOSITY BUILD-UP
(HOEPPLER, ISO 9371B)

	[°C]	*[mPa s]*	*[min]*
Araldite® LY 8615 / Aradur® 8615	at 60	to 1500	45 - 65
Araldite® LY 8615 / XB 5173	at 60	to 1500	20 - 40
Araldite® LY 8615 / Aradur® 8615	at 60	to 3000	55 - 75
Araldite® LY 8615 / XB 5173	at 60	to 3000	25 – 45
Araldite® LY 8615 / Aradur® 8615	at 80	to 1500	21 – 41
Araldite® LY 8615 / XB 5173	at 80	to 1500	8 – 24
Araldite® LY 8615 / Aradur® 8615	at 80	to 3000	25 – 45
Araldite® LY 8615 / XB 5173	at 80	to 3000	10 - 26

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	*Cure:*	T_G	*Araldite® LY 8615 Aradur® 8615*	*Araldite® LY 8615 XB 5173*
(IEC 1006, DSC, 10 K/MIN)	90 min. 80℃	[℃]	64 - 71	80 - 87
	90 min. 80℃ + 1h 150℃	[℃]	184 - 191	174 - 181
	90 min. 80℃ + 1h 150℃+ 1h 180℃	[℃]	206 - 217	200 - 207
	90 min. 80℃ + 1h 150℃+ 3h 180℃	[℃]	210 - 220	203 - 210
GLASS TRANSITION TEMPERATURE	*Cure:*		*Araldite® LY 8615 Aradur® 8615*	*Araldite® LY 8615 XB 5173*
(ISO 6721, DMA,2K/MIN.)	90 min. 80℃ + 1h 150℃	[℃]	184 - 190	207 - 215
	90 min. 80℃ + 1h 150℃+ 1h 180℃	[℃]	214 - 221	210 - 217
TENSILE TEST (ISO 527)	*Cure:* 90 min. 80℃ + 1h 150℃		*Araldite® LY 8615 Aradur® 8615*	*Araldite® LY 8615 XB 5173*
	Tensile strength	[MPa]	40 - 45	33 - 38
	Ultimate elongation	[%]	1.5 - 2.3	1.0 - 2.0
	Tensile modulus	[MPa]	2650 - 2850	2880 - 3080
TENSILE TEST (ISO 527)	*Cure:* 90 min. 80℃ + 1h 150℃+ 1h 180℃		*Araldite® LY 8615 Aradur® 8615*	*Araldite® LY 8615 XB 5173*
	Tensile strength	[MPa]	39 - 43	41 - 45
	Ultimate elongation	[%]	1.2 - 2.2	1.2 - 2.2
	Tensile modulus	[MPa]	2780 - 2980	3000 - 3200

FLEXURAL TEST (ISO 178)	*Cure:* 90 min. 80°C + 1h 150°C		*Araldite® LY 8615 Aradur® 8615*	*Araldite® LY 8615 XB 5173*
	Flexural strength	[MPa]	92 - 97	115 - 125
	Ultimate elongation	[%]	3.3 – 4.5	4.9 – 5.9
	Flexural modulus	[MPa]	2650 - 2850	2850 - 3050
FLEXURAL TEST (ISO 178)	*Cure:* 90 min. 80°C + 1h 150°C+ 1h 180°C		*Araldite® LY 8615 Aradur® 8615*	*Araldite® LY 8615 XB 5173*
	Flexural strength	[MPa]	82 - 86	113 - 117
	Ultimate elongation	[%]	2.7 – 3.7	4.1 – 5.1
	Flexural modulus	[MPa]	2740 - 2940	3080 - 3280
FRACTURE PROPERTIES BEND NOTCH TEST (PM 258-0/90)	*Cure:* 90 min. 80°C + 1h 150°C		*Araldite® LY 8615 Aradur® 8615*	*Araldite® LY 8615 XB 5173*
	Fracture toughness K_{1C}	[MPa√m]	0.57 – 0.72	0.60 – 0.84
	Fracture energy G_{1C}	[J/m^2]	140 - 170	147 - 179
FRACTURE PROPERTIES BEND NOTCH TEST (PM 258-0/90)	*Cure:* 90 min. 80°C + 1h 150°C+ 1h 180°C		*Araldite® LY 8615 Aradur® 8615*	*Araldite® LY 8615 XB 5173*
	Fracture toughness K_{1C}	[MPa√m]	0.59 – 0.74	0.54 – 0.70
	Fracture energy G_{1C}	[J/m^2]	130 - 165	130 - 165
WATER ABSORBTION (ISO 62)	*Cure:* 90 min. 80°C + 1h 150°C		*Araldite® LY 8615 Aradur® 8615*	*Araldite® LY 8615 XB 5173*
	10 days H_2O 23°C	[%]	0.50 – 0.60	0.53 – 0.63
WATER ABSORBTION (ISO 62)	*Cure:* 90 min. 80°C + 1h 150°C+ 1h 180°C		*Araldite® LY 8615 Aradur® 8615*	*Araldite® LY 8615 XB 5173*
	10 days H_2O 23°C	[%]	0.55 – 0.65	0.55 – 0.65

PROPERTIES OF THE CURED, REINFORCED FORMULATION

Short beam: Laminate comprising 12 layers
Carbon fabric G1157 (290 g/m^2)
Laminate thickness t = 3.0 mm
Fibre volume content: 63 - 65 %

INTERLAMINAR SHEAR TEST (ASTM D 2344)	*Cure:* 90 min. 80°C+ 1h 150°C+ 1h 180°C		*Araldite® LY 8615 Aradur® 8615*	*Araldite® LY 8615 XB 5173*
	Shear strength	[MPa]	72 - 77	76 - 81
FLEXURAL TEST (ISO 178)	*Cure:* 90 min. 80°C+ 1h 150°C+ 1h 180°C		*Araldite® LY 8615 Aradur® 8615*	*Araldite® LY 8615 XB 5173*
	Flexural strength	[MPa]	1260 - 1460	1170 - 1470
	Ultimate strength	[MPa]	1150 - 1350	1080 - 1280
	Ultimate elongation	[%]	1.00 – 1.20	0.90 – 1.10
	Flexural modulus	[MPa]	113500 - 133000	114000 - 134000
TENSILE TEST (ISO 527)	*Cure:* 90 min. 80°C+ 1h 150°C+ 1h 180°C		*Araldite® LY 8615 Aradur® 8615*	*Araldite® LY 8615 XB 5173*
	Tensile strength	[MPa]	1360 - 1560	1520 - 1720
	Ultimate strength	[MPa]	1330 - 1530	1450 - 1650
	Ultimate elongation	[%]	0.89 – 1.09	0.84 – 1.04
	Tensile modulus	[MPa]	120500 - 140000	129000 - 149000

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.

Huntsman Advanced Materials
(Switzerland) GmbH
Klybeckstrasse 200
4057 Basel
Switzerland

Tel: +41 (0)61 299 11 11
Fax: +41 (0)61 299 11 12

www.huntsman.com/advanced_materials
Email:
advanced_materials@huntsman.com