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Advanced Materials

Araldite® LY 3031 / Aradur® 3032

WARM CURING EPOXY SYSTEM

Araldite® LY 3031 is an epoxy resin
Aradur® 3032 is an amine hardener

APPLICATIONS

Mass production of Automotive composites

PROPERTIES

Very fast cure system for composite parts

PROCESSING

- Wet Compression Moulding

PRODUCT DATA

Araldite® LY 3031		
Aspect (visual)	clear liquid	
Viscosity at 25 °C (ISO 12058-1)	10000 – 12000 **	[mPa.s]
Density at 25 °C (ISO 1675)	1.15 – 1.20	[g/cm^3]
Epoxy index (ISO 3001)	5.30 – 5.50**	[Eq/kg]
Aradur® 3032		
Aspect (visual)	Transparent yellowish clear liquid	
Viscosity at 25 °C (ISO 12058-1)	20 – 60**	[mPa.s]
Density at 25 °C (ISO 1675)	0.94 – 1.0	[g/cm^3]
Amine value (ISO 9702)	1020 – 1200**	[mgX/g]

*** 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 3031 or Aradur® 3032 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.

TYPICAL SYSTEM DATA

PROCESSING DATA

MIX RATIO

Components	*Parts by weight*	*Parts by volume*
Araldite® LY 3031	100	100
Aradur® 3032	21	25

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.

Internal release agent with an amount of 0.5 – 2% is typically added to the system. It can either be mixed in as a 3rd component or premixed into the Araldite® LY 3585. The added amount depends on internal release agent type and part demolding behavior. Internal release agent used in this TDS is PAT657/HC from E. & P. Würtz GmbH & Co. (In der Weide 18, D-55411 Bingen am Rhein, Germany). Refer to respective E. & P. Würtz GmbH & Co. TDS for processing & handling details.

Components	*Parts by weight*	*Parts by volume*
Araldite® LY 3031	100	100
Aradur® 3032	21	25
PAT657/HC	0.5 – 2	0.5 – 2

POT LIFE (TECAM 100G, 65%RH)

[°C]	*[min]*
at 23	15 - 25

GEL TIME (HOT PLATE)

[°C]	*[sec]*
at 120	22 - 26
at 130	16 - 20
at 140	14 - 16
at 150	10 - 12

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.

INITIAL MIX VISCOSITY (CONE-PLATE VISCOSIMETER)

[°C]	*[mPa.s]*
at 25	1600 - 2000
at 150	< 10

PROPERTIES OF THE CURED, NEAT FORMULATION

Sample thickness 2 mm
5 min cure at 100°C
Above conditions have been used to generate meaningful data and avoid exotherm during coupons production

	Components		*Parts by weight*	*Parts by volume*
	Araldite® LY 3031		100	100
	Aradur® 3032		21	25
	PAT657/HC		1.5	1.5
TENSILE TEST (ISO 527-2)	Tensile modulus	[MPa]		2650 – 2850
	Tensile strength	[MPa]		70 – 80
	Ultimate elongation	[%]		5.0 – 7.0
FRACTURE PROPERTIES BEND NOTCH TEST (ISO 13586)	Fracture toughness K_{1C}	[MPa√m]		1.0 – 1.1
	Fracture energy G_{1C}	[J/m²]		320 – 380
WATER ABSORPTION (ISO 62)	After 168 hours at 23°C	[%]		0.70 – 0.75

PROPERTIES OF THE CURED, REINFORCED FORMULATION

Samples: 6 layers Carbon fabric UD (333g/m2); Panex PX35 UD300
Laminate thickness: 2.0 – 2.2mm
Fibre volume content: 47 – 53%

GLASS TRANSITION TEMPERATURE (ISO 11357-2, DSC, 5K/MIN)	*Cure:*		*30 sec. 140°C*
	Tg midpoint	[°C]	110 – 120
GLASS TRANSITION TEMPERATURE (ISO 6721-4, DMA) 2K/MIN, G' onset	*Cure:*		*30 sec. 140°C*
	Tg	[°C]	95 – 105

We recommend to specify and assess Tg on composites and not on neat resin. Indeed the exothermic behavior during neat resin coupons production is generating a significant temperature rise resulting in the resin curing to a much higher temperature and hence leading to higher Tg value compared to the final composite part.

INTERLAMINAR SHEAR STRENGHT (ASTM D 2344)	*Cure:*		*30 sec. 140°C*
	Shear strength	[MPa]	63 – 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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