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Advanced Materials

Araldite® LY 1556* / Aradur® 1571* / Accelerator 1573* Hardener XB 3403*

PREPREG SYSTEM BASED ON CHEMICAL B-STAGE

Araldite® LY 1556 (Epoxy resin)
Aradur® 1571 (Hardener paste)
Accelerator 1573 (Accelerator paste)
Hardener XB 3403 (Hardener based on polyamine)

APPLICATIONS	Industrial composites		
PROPERTIES	Prepreg system with a long shelf life and curable from 80°C on		
PROCESSING	Prepreging		
PRODUCT DATA	**Araldite® LY 1556**		
	Aspect (visual)	clear, pale yellow liquid	
	Viscosity at 25 °C (ISO 12058)	9500 - 12000**	[mPa s]
	Density at 25 °C (ISO 1675)	1.15 - 1.20	[g/cm^3]
	Epoxy index (ISO 3001)	5.1 - 5.3**	[Eq/kg]
	Aradur® 1571		
	Aspect (visual)	White viscous paste	
	Viscosity at 25 °C	28000 - 40000	[mPa s]
	Density at 25 °C (ISO 1675)	1.2	[g/cm^3]
	Accelerator 1573		
	Aspect (visual)	White viscous paste	
	Viscosity at 25 °C	60000 - 90000	[mPa s]
	Density at 25 °C (ISO 1675)	1.08	[g/cm^3]
	Hardener XB 3403		
	Aspect (visual)	clear liquid	
	Viscosity at 25 °C	5 - 20	[mPa s]
	Density at 25 °C (ISO 1675)	1.0	[g/cm^3]
STORAGE	Provided that Araldite® LY 1556 and Aradur® 1571, Aradur® 1573 or XB 3403 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.		

** *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	System 1	System 2	System 3
Araldite® LY 1556	100	100	100
Aradur 1571	23	23	23
Accelerator 1573	3	5	7
Hardener XB 3403	12	12	12

Mix Aradur 1571 with Accelerator 1573 to get homogeneous paste, this pre-mix has a long shelf life at RT and can be used within 2 weeks at room temperature.

The premix Aradur 1571/Accelerator 1573 is blended into the resin Araldite LY 1556. Add the hardener XB 3403 and mix homogeneously just before the prepregging process.

The prepreg tackiness can be adjusted by the amount of the hardener XB 3403.

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			System 1	System 2	System 3
	at 25 °C	*[mPas]*	4000 – 6000	4000 - 6000	4000 - 6000

POT LIFE (TECAM, 100 ML, 65 % RH)		System 1	System 2	System 3
	[min]	450 - 550	450 - 550	450 - 550

GEL TIME (HOT PLATE)			System 1	System 2	System 3
	at 110 °C	*[min]*	17 - 20	13 - 15	12 - 14
	at 120 °C	*[min]*	9 - 11	7 - 9	6 - 7
	at 130 °C	*[min]*	5 - 6	3 - 5	3 - 4

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.

PREPREG PRODUCTION		
	Impregnation bath temperature	25 - 30 °C

B-STAGING (PRE REACTION)	For all the systems 24-48h at 23-25 °C

PREPREG SHELF LIFE		System 1	System 2	System 3
	at 23 °C	> 6 weeks	> 6 weeks	> 6 weeks

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PROPERTIES OF THE CURED, NEAT FORMULATION

GLASS TRANSITION TEMPERATURE (ISO 11357-2 DSC, 10 K/MIN)	*Cure: after B-Stage*		System 1 T_G [°C]	System 2 T_G [°C]	System 3 T_G [°C]
	4 h 90 °C		75 - 85	95 - 100	90 - 100
	6 h 100 °C		105 - 110	110 - 115	110 - 115
	2 h 120 °C		105 - 110	110 - 115	110 - 115
FLEXURAL TEST (ISO 178)	Cure cycle 2h 120°C	Tested at 23°C	System 1	System 2	System 3
	Flexural strength	[MPa]	125 - 135	127 - 137	130 - 140
	Ultimate elongation	[%]	7 - 10	7 - 9	7 - 9
	Flexural modulus	[MPa]	2900 - 3100	2950 - 3150	3000 - 3200
FRACTURE PROPERTIES BEND NOTCH TEST (ISO 13586)	Cure cycle 2h 120°C	Tested at 23°C	System 1	System 2	System 3
	Fracture toughness K_{1C}	[MPa√m]	0.70 - 0.80	0.75 - 0.85	0.70 - 0.80
	Fracture energy G_{1C}	[J/m^2]	130 - 170	210 - 250	130 - 170

PROPERTIES OF THE CURED, REINFORCED FORMULATION

Samples: 12 layers of unidirectional E-glass fabric (425 g/m^2)
Laminate thickness: 3.1 - 3.3 mm
Cure cycle 2h at 120°C

INTERLAMINAR SHEAR TEST (ASTM D 2344)		Tested at 23°C	System 1	System 2	System 3
	Shear strength	[MPa]	55 - 65	55 - 65	55 - 65

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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