HUNTSMAN

Enriching lives through innovation

Advanced Materials

Araldite® CY 179* / Aradur® 917 / Accelerator DY 070

HOT CURING EPOXY MATRIX SYSTEM

Araldite CY 179 is a low viscosity epoxy resin
Aradur 917 is an anhydride hardener
Accelerator DY 070 is an imidazole accelerator

APPLICATIONS	High performance composite parts		
PROPERTIES	Extremely low viscosity, anhydride-cured, reactive diluent free matrix system with a long pot life. Displays very good temperature resistance after post cure.		
PROCESSING	• Filament Winding • Pultrusion • Pressure Moulding		
PRODUCT DATA	**Araldite® CY 179**		
	Aspect (visual)	clear liquid	
	Viscosity at 25 °C (ISO 12058-1)	250 – 450 **	[mPa s]
	Density at 25 °C (ISO 1675)	1.17	[g/cm^3]
	Epoxy Index (ISO 3001)	7.0 – 7.7 **	[eq/kg]
	Aradur® 917		
	Aspect (visual)	clear liquid	
	Viscosity at 25 °C (ISO 12058-1)	50 – 100 **	[mPa.s]
	Density at 25 °C (ISO 1675)	1.20 - 1.25	[g/cm^3]
	Accelerator DY 070		
	Aspect (visual)	clear liquid	
	Viscosity at 25 °C (ISO 12058-1)	≤ 50	[mPa.s]
	Density at 25 °C (ISO 1675)	0.95 - 1.05	[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® CY 179, Aradur® 917 and Accelerator DY 070 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. Because Aradur® 917 is sensitive to moisture, storage containers should be ventilated with dry air only.

* *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® CY 179	100	100
Aradur® 917	115	110
Accelerator DY 070	0.5 - 2	0.6 - 2.4

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.

INITIAL MIX VISCOSITY

(PLATE-PLATE VISCOMETER Ø 40MM)

	[°C]	*[mPa s]*
	at 25	100 - 200
	at 40	40 - 80
	at 60	20 - 30

Araldite® CY 179	*[pbw]*	100	100
Aradur® 917	*[pbw]*	115	115
Accelerator DY 070	*[pbw]*	1	2

POT LIFE

(TECAM, 100 ML, 65 % RH)

[°C]	*[days]*	*[days]*
at 23	≥ 2	1 - 1.5
at 40		15 - 25

GEL TIME

(HOT PLATE)

[°C]	*[min]*	*[min]*
at 90		30 - 50
at 100		20 - 25
at 120		6 - 8
at 140		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.

TYPICAL CURE CYCLES

1 - 2 h 100 °C + 6 h 160 °C
or 1 - 2 h 100 °C + 4 - 6 h 180 °C

The optimum cure cycle has to be determined case by case depending on the processing and the economic requirements.

PROPERTIES OF THE CURED, NEAT FORMULATION

The values below were obtained with a formulation using 2 pbw Accelerator DY 070

GLASS TRANSITION TEMPERATURE (ISO 11357-2, DSC, 10 K/MIN)	*Cure:* 1 h 100 °C + 6 h 180 °C	*T_G [°C]* 200 - 205

GLASS TRANSITION TEMPERATURE (ISO 75,TMA, 5 K/MIN)	*Cure:* 1 h 100 °C + 6 h 180 °C	*T_G [°C]* 200

TENSILE TEST (ISO 527)		*Cure:*	*1 h 100 °C + 6 h 180 °C*
	Tensile strength	[MPa]	48 - 60
	Elongation at tensile strength	[%]	1.8 - 2.5
	Tensile modulus	[MPa]	2900 - 3000
FLEXURAL TEST (ISO 178)		*Cure:*	*1 h 100 °C + 6 h 180 °C*
	Flexural strength	[MPa]	75 -95
	Elongation at flexural strength	[%]	2.0 - 3.5
	Ultimate strength	[MPa]	75 -95
	Ultimate elongation	[%]	2.0 - 3.5
	Flexural modulus	[MPa]	2700 - 2900
FRACTURE PROPERTIES BEND NOTCH TEST (ISO 13586)		*Cure:*	*1 h 100 °C + 6 h 180 °C*
	Fracture toughness K_{1C}	[MPa√m]	0.46 - 0.50
	Fracture energy G_{1C}	[J/m^2]	65 - 75
WATER ABSORPTION (ISO 62)	*Immersion:*	*Cure:*	*1 h 100 °C + 6 h 180 °C*
	4 days H_2O 23 °C	[%]	0.85 - 1.00
	10 days H_2O 23 °C	[%]	1.40 - 1.55
	30 min H_2O 100 °C	[%]	0.25 - 0.35
	60 min H_2O 100 °C	[%]	0.45 - 0.55
COEFFICIENT OF LINEAR THERMAL EXPANSION (ISO 11359-2)	*Mean value:*	*Cure:*	*1 h 100 °C + 6 h 180 °C*
	α from 20 - 170 °C	[10^{-6}/K]	60 – 65

PROPERTIES OF THE CURED, REINFORCED FORMULATION

INTERLAMINAR SHEAR STRENGTH (ASTM D 2344)

Short beam: E-glass unidirectional specimen,
Laminate thickness t = 3.2 mm
Fibre volume content: 60 %
Cure: 1 h 100 °C + 6 h 180 °C

		1 h 100 °C + 6 h 180 °C
Unconditioned	[MPa]	62 - 66
After 1 h in H_2O 100 °C	[MPa]	63 - 67

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
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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