

**ANCAMINE<sup>®</sup> DL50****Curing Agent****DESCRIPTION**

Ancamine DL50 curing agent is a liquid mixture of aromatic amines based on methylenedianiline (MDA). In addition to MDA, Ancamine DL50 curative contains polymethylene polyanilines and aromatic amines with functionality greater than 4. The multifunctional nature of polymethylene polyanilines can increase the crosslink density of a completely cured epoxy compared with methylenedianiline. Ancamine DL50 curative is best suited for use as an epoxy curative in forced cure applications. This aromatic, multifunctional curative can be used to produce high-strength, chemically-resistant, elevated temperature tolerant epoxy parts. Epoxy systems cured with Ancamine DL50 curative offer excellent resistance to water, acid, alkali and hydrocarbon solvents.

**TYPICAL PROPERTIES**

Property	Value	Unit
Appearance	Yellow to Light Brown	
Colour	9	Gardner
Viscosity @ 77°F / 25°C	55,000	@ 30°C
Specific Gravity @ 77°F / 25°C	1.1	
Equivalent Wt/{H}	51	
Recommended Use Level	28.0	PHR

**ADVANTAGES**

- Long pot life at moderate temperatures
- Excellent mechanical properties following elevated temperature cure
- Good resistance against acids, alkali, water, and hydrocarbon solvents when heat cured

**APPLICATIONS**

- Laminating
- Filament Wound Pipe / Liners / Fittings
- Pre-preg Fabrication
- Casting and Tooling

**RECOMMENDED PROCESSING**

- Filament Winding
- Resin Transfer Molding
- Fiber Impregnation in a Controlled Environment

## SHELF LIFE

At least 24 months from the date of manufacture in the original sealed container at ambient temperature. Store away from excessive heat and humidity in tightly closed containers.

## STORAGE AND HANDLING

Refer to the Safety Data Sheet for Ancamine DL50 curing agent.

## TYPICAL CURE SCHEDULE

(will vary with application)  
2 hours at 176°F, then 3 hours at 302°F  
2 hours at 80°C, then 3 hours at 150°C

## TYPICAL HANDLING PROPERTIES \*

Property	Value	Unit
Mixed Viscosity @ 140°F / 60°C	335	cPs
Gel Time (150g mix @ 77°F/ 25°C)	480	min
Time to 10,000 cPs @ 140°F / 60°C	189	min

TABLE 3: THERMAL PERFORMANCE \*

Property	SI	English
Glass Transition Temperature (DSC second scan)	161 °C	322 °F

TABLE 4: MECHANICAL PERFORMANCE - CAST PANEL \*

Property	SI	English
Flexural Strength	175 MPa	25.4 ksi
Flexural Modulus	3.4 GPa	0.49 Msi
Tensile Strength	73 MPa	10.6 ksi
Tensile Modulus	3.2 GPa	0.46 Msi
Tensile Elongation @ Break	4.4%	4.4%
Compressive Strength	121 MPa	17.5 ksi
Compressive Modulus	2.0 GPa	0.29 Msi

\*Ancamine DL 50 curing agent formulated with standardBisphenol-A based (DGEBA, EEW=180) epoxy resin

TABLE 5: MECHANICAL PERFORMANCE - COMPOSITE PANEL \*

Property	SI	English
ILSS 0° Longitude	74 MPa	10.7 ksi
Flexural Strength - Composite 0° Longitude	1172 MPa	170.0 ksi
Flexural Modulus - Composite 0° Longitude	52.8 GPa	7.66 Msi

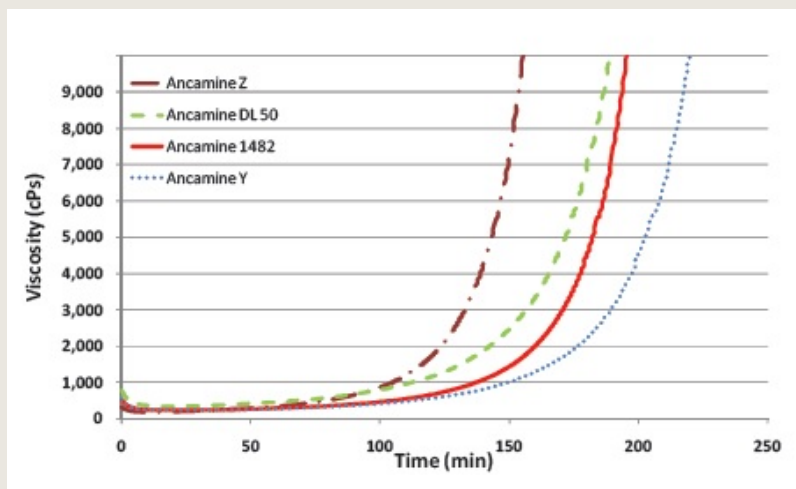
\*Ancamine DL 50 curing agent formulated with standard Bisphenol-A based (DGEBA, EEW=180) epoxy resin

## MDA-BASED AROMATIC AMINES SUPPLEMENTARY DATA

### REACTIVITY AND DEVELOPMENT OF CURE

Ancamine® DL50, Ancamine 1482, Ancamine Y, and Ancamine Z curing agents offer a range of reactivity with epoxy resin while maintaining the high mechanical properties and chemical resistance typical of aromatic amines. Blended with standard diglycidyl ether of bisphenol-A (DGEBA) epoxy resin, systems can provide a 2 to 3.5 hour pot life even at 60°C. Figure 1 shows the viscosity build of aromatic amines with EEW=180 DGEBA resin at 60°C.

FIGURE 1: AROMATIC AMINE DGEBA (EEW=180) MIX VISCOSITY BUILD AT 60°C



### CHEMICAL RESISTANCE

DGEBA epoxy resin cured with Ancamine DL-50, Ancamine 1482, Ancamine Y, and Ancamine Z curatives exhibits excellent chemical resistance. with DGEBA resin. Chemical resistance can be further enhanced using novalac epoxy resins.

TABLE 6: CHEMICAL RESISTANCE TEST

<b>Chemical Resistance Test</b>				
Formulation: DGEBA Epoxy Resin Mix (EEW=180)				
Cure Schedule: 2 h @ 80°C, then 3 h @ 150°C				
Specimen: 1" X 3" X 1/8" Disc				
Test: % Weight gain after 120 days immersion @ 73°F / 24°C				
<b>Reagent</b>	<b>Ancamine DL 50</b>	<b>Ancamine 1482</b>	<b>Ancamine Y</b>	<b>Ancamine Z</b>
Water (Distilled)	0.6%	0.9%		
Jet Fuel C	0.1%		0.6%	0.3%
Toluene	0.2%	0.4%	0.2%	0.1%
Acetone	10.7%		15.9%	20.1%
Ethanol	0.8%	0.5%	0.6%	0.7%
Methanol	5.0%	1.4%		
HNO <sub>3</sub> (20%)	0.9%	1.0%	0.3%	0.3%
Acetic Acid (25%)	1.4%	0.7%	1.1%	1.1%

## PERFORMANCE PROPERTIES

Ancamine<sup>®</sup> DL50, Ancamine 1482, Ancamine Y, and Ancamine Z curing agents are mixtures of aromatic amines designed for the curing of liquid epoxy resins at elevated temperatures. See table 7 for a comparison of typical properties.

TABLE 7: PERFORMANCE PROPERTIES

Typical Properties	Ancamine DL 50		Ancamine 1482		Ancamine Y		Ancamine Z	
	SI	English	SI	English	SI	English	SI	English
Appearance	Yellow to Light Brown		Dark Brown		Liquid Yellow to Light Brown		Dark Liquid	
Color (Gardner)	9		18		6		No Data	
Viscosity @ 77°F / 25°C	55,000 @ 30°C		1,900 cP		1,200 cP		2,200 cP	
Specific Gravity @ 77°F / 25°C	1.10		1.15		1.14		1.14	
Equivalent Wt/{H}	51		42		48.5		38	
Use Level (PHR)	28.0		23.0		27.0		21.0	
<b>Typical Handling Properties<sup>(1)</sup></b>								
Mixed Viscosity @ 140°F / 60°C	335 cP		235 cP		235 cP		185 cP	
Gel Time (150g mix @ 77°F / 25°C)	480 min		960 min		480 min		480 min	
Time to 10,000 cPS @ 140°F / 60°C	189 min		195 min		220 min		155 min	
<b>Thermal Performance<sup>(1)</sup></b>								
Glass Transition Temperature (DSC second scan)	161°C	322°F	160°C	320°F	167°C	333°F	155°C	311°F
<b>Mechanical Performance - Cast Panel<sup>(1)</sup></b>								
Flexural Strength	175 MPa	25.4 ksi	123 MPa	17.8 ksi	177 MPa	25.7 ksi	164 MPa	23.8 ksi
Flexural Modulus	3.4 GPa	0.49 Msi	2.5 GPa	0.36 Msi	3.7 GPa	0.54 Msi	3.7 GPa	0.54 Msi
Tensile Strength	73 MPa	10.6 ksi	81 MPa	11.7 ksi	60 MPa	8.7 ksi	74 MPa	10.7 ksi
Tensile Modulus	3.2 GPa	0.46 Msi	2.8 GPa	0.41 Msi	3.3 GPa	0.48 Msi	3.7 GPa	0.54 Msi
Tensile Elongation @ Break	4.4%		5.3%		4.2%		4.4%	
Compressive Strength	121 MPa	17.5 ksi	122 MPa	17.7 ksi	120 MPa	17.4 ksi	129 MPa	18.7 ksi
Compressive Modulus	2.0 GPa	0.29 Msi	2.2 GPa	0.32 Msi	2.1 GPa	0.30 Msi	3.1 GPa	0.45 Msi
Izod Impact Strength			45.6 J/m	0.3 ft-lb/in	33.6 J/m	0.2 ft-lb/in		
<b>Mechanical Performance - Composite Panel<sup>(2)</sup></b>								
ILSS 0° Longitude	74 MPa	10.7 ksi	71 MPa	10.4 ksi	70 MPa	10.1 ksi	72 MPa	10.5 ksi
Flexural Strength - Composite 0° Longitude	1172 MPa	170.0 ksi	1310 MPa	190.0 ksi	1269 MPa	184.0 ksi	1282 MPa	186.0 ksi
Flexural Modulus - Composite 0° Longitude	52.8 GPa	7.66 Msi	54.1 GPa	7.85 Msi	55.2 GPa	8.0 Msi	49.0 GPa	7.81 Msi

<sup>(1)</sup> Curing agents formulated with standard Bisphenol-A based (DGEBA, EEW=180) epoxy resin

<sup>(2)</sup> VARTM Process using E-glass (275g/m<sup>2</sup>) unidirectional fiber; 60% Volume ±3%; Cured for 2 hours at 80°C ad 3 hours at 150°C

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