

# ANCAMINE® 1482 Curing Agent

## DESCRIPTION

Ancamine 1482 curing agent is a liquid eutectic mixture of aromatic amines designed to cure liquid epoxy resins. Relative to conventional solid aromatic amines, this product offers the advantage of extending pot life by permitting the mixing of the resin and curing agent at room temperature. As a result, waste due to premature gelation can be reduced or even eliminated. As an elevated temperature curing agent for liquid epoxy resins, Ancamine 1482 curing agent is similar in performance to standard solid aromatic amines such as methylene dianiline (MDA) and metaphenylene diamine (mPDA). It provides excellent chemical resistance, typical of aromatic amines.

Ancamine 1482 curing agent is FDA approved as an epoxy hardener under 21 CFR 177.2280 for the manufacture of repeat use articles such as filament-wound pipes and tanks. Where appearance is important, systems based on this product should be formulated in dark or "shade" colors only.

## APPLICATIONS

- Pre-impregnated laminates
- Filament wound pipe and tanks
- Casting and laminates that require good electrical properties with high heat and chemical resistance.

## RECOMMENDED PROCESSING

- Filament winding
- Resin transfer molding
- Wet lay-up laminates

## BENEFITS

- Long pot life
- Can be mixed at room temperature
- Provides excellent chemical and heat resistance

## TYPICAL CURE SCHEDULE

- 2 hours at 176°F, then 3 hours at 302°F
- 2 hours at 80°C, then 3 hours at 150°C

## SHELF LIFE

At least 60 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.

**TABLE 1: TYPICAL PROPERTIES**

<b>Appearance</b>	Dark Brown Liquid
<b>Color (Gardner)</b>	18
<b>Viscosity @ 77°F / 25°C</b>	1,900 cPs
<b>Specific Gravity @ 77°F / 25°C</b>	1.15
<b>Amine Value</b>	775
<b>Equivalent Wt/{H}</b>	42
<b>Use Level (PHR)</b>	23.0

**TABLE 2: TYPICAL HANDLING PROPERTIES <sup>(1)</sup>**

<b>Mixed Viscosity @ 140°F / 60°C</b>	235 cPs
<b>Gel Time (150g mix @ 77°F / 25°C)</b>	960 min
<b>Time to 10,000 cPs @ 140°F / 60°C</b>	195 min

**TABLE 3: THERMAL PERFORMANCE <sup>(1)</sup>**

	SI	English
<b>Glass Transition Temperature (DSC second scan)</b>	160°C	320°F

**TABLE 4: MECHANICAL PERFORMANCE - CAST PANEL <sup>(1)</sup>**

	SI	English
Flexural Strength	123 MPa	17,840 psi
Flexural Modulus	2.5 GPa	362.6 ksi
Tensile Strength	81 MPa	11,748 psi
Tensile Modulus	2.8 GPa	406.1 ksi
Tensile Elongation @ Break	5.3%	
Compressive Strength	122 MPa	17,695 psi
Compressive Modulus	2.2 GPa	319.1 ksi
Izod Impact Strength	45.6 J/m	0.9 ft-lb/in

**TABLE 5: MECHANICAL PERFORMANCE - COMPOSITE PANEL <sup>(1)</sup>**

	SI	English
ILSS 0° Longitude	71 MPa	10.4 ksi
Flexural Strength - Composite 0° Longitude	1310 MPa	190 ksi
Flexural Modulus - Composite 0° Longitude	54.1 GPa	7.85 Msi

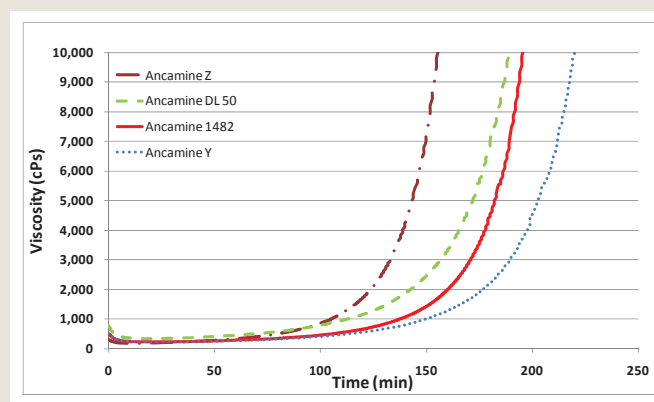
(1) Ancamine 1482 curing agent formulated with standard Bisphenol-A based (DGEBA, EEW=180) epoxy resin

## 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**

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				
Reagent	Ancamine DL 50	Ancamine 1482	Ancamine Y	Ancamine Z
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® 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		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

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

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

Epoxy Curing Agents and Modifiers

# ANCAMINE® 1482 Curing Agent

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