

## Product information

# ANCAMIDE<sup>®</sup> 2634

## Curing Agent

### DESCRIPTION

Ancamide 2634 is a modified polyamide curing agent designed for use in two component solvent borne epoxy coatings where high performance and cost effectiveness are key requirements. Ancamide 2634 offers high corrosion and chemical resistance along with good heat resistance, cathodic disbondment resistance, high blush resistance, good flexibility and good adhesion.

Ancamide 2634 can be used over a broad temperature range. Its ability to cure at low temperatures and develop a high T<sub>g</sub> when heat cured, makes Ancamide 2634 an excellent candidate for both low temperature and high temperature applications.

### TYPICAL PROPERTIES

Property	Value	Unit	Method
Appearance	Amber resinous liquid, slight haze		
Colour	7	Gardner	ASTM D 1544-80
Viscosity @ 77°F	1,700	cPs	ASTM D 445-83, Brookfield, RVTD, Spindle 4
Amine Value	335	mg KOH/g	Perchloric Acid Titration
Specific Gravity @ 77°F	0.96	g/ml	ASTM D 1475-85
Weight per Gallon	7.99		
Flash Point	111	°F	Seta Flash Closed Cup
Non-volatile	80	wgt %	
Solvent	20	n-butanol wgt %	
Equivalent Wt/{H}	90		
Recommended Use Level	48	PHR	EEW=190

### ADVANTAGES

- High corrosion and chemical resistance
- Broad application and service temperature range
- Very cost effective
- High blush resistance
- Good cathodic disbondment resistance
- Good flexibility and adhesion
- DOT non-corrosive

## APPLICATIONS

- Metal primers
- Build coats and barrier coats
- Gloss enamels

## 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.

## PACKAGING AND HANDLING

Refer to the Safety Data Sheet for Ancamide 2634 curing agent.

## TYPICAL CURE SCHEDULE

**Ambient: 2-7 days**  
**Heat Cure: 2-4 hrs at 200-240°F**

## TYPICAL PERFORMANCE PROPERTIES\*

Property	Value	Unit	Method
Mixed Viscosity @ 77°F	4,000	cPs	ASTM D 445-83, Brookfield, RVTd, Spindle 4
Gel Time (150g mix @ 77°F)	> 180	min	Techne GT-3 Gelation Timer
Thin Film Set Time 25°C	7	h	
Hard Dry Time	12	h	
Glass Transition Temperature	240	°F	ASTM D 3418-82 7 Maximum T <sub>g</sub> = 240°F when sample is fully heat cured

\* Cured with liquid Bisphenol-A based epoxy resin (EEW=190)

## SUPPLEMENTARY DATA

**CORROSION PROTECTION:** Ancamide 2634 provides significantly higher corrosion protection than conventional polyamides allowing the formulator to reduce expensive anticorrosive pigments and save money.

Ancamide 2634 and a conventional polyamide Ancamide 260A were compared in similar formulations as shown below. In the Ancamide 2634 formulation the anticorrosive pigment was reduced by 50%. As the salt fog results demonstrate, performance can be improved and costs reduced by utilizing Ancamide 2634.

TABLE 3: ANCAMIDE 2634 PRIMER (FORMULATION V )

<b>A Side</b>	<b>Pounds</b>	<b>Gallons</b>
Liquid Epoxy	282.4	29.17
Anti-terra U80	2.6	0.31
Modaflow Resin	7.7	0.92
Xylene	55.1	7.68
MPK	28.2	4.22
Talc	179.4	7.70
<b>Total</b>	<b>555.3</b>	<b>50.0</b>
<b>B Side</b>		
Ancamide 2634	128.8	15.58
Nevchem LR	25.6	3.01
Benzyl Alcohol	19.2	2.20
n-Butanol	85.2	12.66
Red Iron Oxide	50.0	1.16
Halox SZP 391	50.0	1.99
Imsil A8 Silica	294.9	13.38
<b>Total</b>	<b>653.7</b>	<b>50.0</b>
<b>Total A + B</b>	<b>1209.0</b>	<b>100.0</b>
PVC	34%	
VOC (lb/gal)	1.96	
Wt Solids	84%	
Vol Solids	72%	

**Corrosion Resistance**

Salt Fog – 500 h exposure 2 mil DFT on shot blasted steel

Overall Rating =

8  
Blisters #6 Few  
0-1 mm scribe creep

Prohesion – 500 h exposure 2 mil DFT on shot blasted steel

Overall Rating =

9  
Blisters – None  
0-1 mm scribe creep

## ANCAMIDE 260A PRIMER

A Side	Pounds	Gallons
Liquid Epoxy	250.5	25.87
Anti-terra U80	2.3	0.28
Modaflow Resin	6.8	0.82
Xylene	48.9	6.82
MPK	25.0	3.74
Talc	159.1	6.83
<b>Total</b>	<b>492.6</b>	<b>44.36</b>
B Side		
Ancamide 260A	133.3	16.46
Nevchem LR	22.7	2.67
Benzyl Alcohol	17.0	1.95
n-Butanol	115.4	17.15
Red Iron Oxide	50.0	1.16
Halox SZP 391	100.0	3.98
Imsil A8 Silica	270.5	12.27
<b>Total</b>	<b>708.9</b>	<b>55.64</b>
<b>Total A + B</b>	<b>1201.5</b>	<b>100.0</b>
PVC	34%	
VOC (lb/gal)	1.9	
Wt Solids	84%	
Vol Solids	72%	

**Corrosion Resistance****Salt Fog – 500 h exposure 2 mil DFT on shot blasted steel****Overall Rating =**5  
Blisters #4 and #6 Medium  
0-1 mm scribe creep**Prohesion – 500 h exposure 2 mil DFT on shot blasted steel****Overall Rating =**9  
Blisters – None  
0-1 mm scribe creep

CHEMICAL RESISTANCE: Ancamide 2634 based coatings exhibit good resistance to organic solvents. A gloss enamel formulation based on Ancamide 2634 and liquid epoxy resin (see Appendix: Formulation II) was exposed to representative solvents and acids for 7 days then evaluated for hardness retention, gloss retention, and blistering. When exposed to ketones, alcohols, and aromatic solvents, Ancamide 2634 based coatings maintain high gloss with no signs of blistering or delamination. Softening of the coatings is largely reversible when the coatings are allowed to recover. For optimum resistance to organic and mineral acids, Ancamide 2634 based coatings should incorporate Bis F and Novolac epoxy resins with a stoichiometric excess of epoxy.

Reagent	Initial Hardness	Hardness 7 Day Exposure	Hardness 1h Recovery	Hardness 4h Recovery	Appearance
MEK	HB	B	B	B	No Blistering, No Gloss Loss
Toluene	HB	HB	HB	HB	No Blistering, No Gloss Loss
PM Solvent	HB	< 6B	5B	4B	No Blistering, V. Slight Gloss Loss
Methanol	HB	HB	HB	HB	No Blistering, No Gloss Loss
10% Acetic Acid	HB	Destroyed	—	—	Dense Blistering
20% Sulphuric Acid	HB	Destroyed	—	—	Dense Blistering

CATHODIC DISBONDMENT RESISTANCE: Ancamide 2634 based formulations exhibit good cathodic disbondment resistance at both ambient and elevated temperatures. The Ancamide 2634 based formulation (see appendix: Formulation IV) was spray applied at 9-10 mil DFT onto shot blasted steel (2 mil profile) and cured 7 days at ambient temperature prior to testing. A ¼" radius holiday was exposed on each coating followed by immersion in 3% NaCl electrolyte at 70°F and 125°F with an impressed current of 1.5 volts. The coatings were rinsed, scribed and tested for adhesion loss and blistering with the following results:

Immersion Temperature	Immersion Time	Disbondment Radius	Blistering	Visual Appearance
70°F	28 Days	0 mm	None	No Effect
70°F	90 Days	0 mm	None	No Effect
125°F	28 Days	0 mm	None	No Effect
125°F	90 Days	0 mm	Yes	8-10 #2 anodic blisters 15-20 mm distance from holiday

**HOT WATER RESISTANCE:** Ancamide 2634 based coatings (see appendix: Formulation IV ) were applied at 6 mil DFT to shot blasted steel (2 mil profile), cured 24 hours at 240°F, then scribed and immersed in deionized (DI) water at 195°F. After 3 days and 7 days immersion, the panels were tested for hardness, cross-hatch adhesion, and appearance.

Test Method	0 Immersion	3 Day Immersion	7 Day Immersion
Pencil Hardness	F	HB	HB
X-Hatch Adhesion	5B	5B	5B
Gloss/Appearance	—	No Change	No Change
Scribe Creep	—	0 mm	0 mm

## FORMULATING GUIDELINES

**Stoichiometry:** Ancamide 2634 develops optimum properties when used at or near 1:1 stoichiometry. A slight (5-10%) excess of epoxy improves corrosion resistance whereas a slight (5-10%) excess of curing agent improves solvent resistance.

**Low Temperature Cure:** Plasticizers such as Epodil® LV5 diluent, Nevchem LR, or Benzyl Alcohol should be added to the formulation to improve ambient and sub-ambient through cure. The typical plasticizer level is 15-25% based on the Ancamide 2634 weight.

**High Temperature Resistance:** When formulating Ancamide 2634 for high temperature service, avoid using plasticizers and epoxy diluents. Ancamide 2634 can develop a  $T_g$  of 240°F when cured at 1:1 stoichiometry with Bis A liquid epoxy. For optimum properties, a heat cure of 2 hrs or longer at 200°F or higher is recommended.

**Accelerating Cure:** Dry times can be accelerated by adding Ancamine® K54 accelerator (5% based on Ancamine 2634 weight) or by adding a fast co-curing agent such as Ancamine 1767, 1768, 2089M, or 2432 (10-20% based on Ancamine 2634 weight). Lacquer dry characteristics can be achieved by using a blend of liquid and solid epoxy resin as shown in Formulation III in the appendix.

**Additives:** Flow and leveling additives such as Modaflow resin, Beetle 216-8, or Byk 307 can be used to eliminate any cratering and improve substrate wetting. Typical use levels are 0.1-0.5% based on total formulation weight.

**Solvent Selection:** Ester solvents should be packaged with epoxy and not packaged with amine curing agents to avoid side reactions. Alcohols such as butanol are strong solvents for Ancamide 2634 but should not be packaged with epoxy resins. Ketones, strong solvents for solid epoxy resins, should be packaged with the epoxy to avoid side reaction with amines.

## APPENDIX – STARTING POINT FORMULATIONS

### FORMULATION I: HIGH SOLIDS BUILD COAT STARTING POINT FORMULATION

Nb.	A Side	Pounds	Gallons	Supplier
1.	Liquid Epoxy (EEW 190)	393.4	40.6	Dow, Shell, etc.
2.	Nevchem LR	21.7	2.6	Neville Chemical
3.	MIBK	26.5	4.0	
4.	TiPure R 960	91.8	2.8	DuPont
	<b>Total</b>	<b>533.4</b>	<b>50.0</b>	
B Side				
5.	Ancamide 2634	186.4	21.9	Evonik
6.	Benzyl alcohol	14.4	1.7	Noveon
7.	Butanol	57.7	8.5	
8.	Nevchem LR	12.9	1.5	Neville Chemical
9.	MPA 2000X	2.6	0.4	Rheox
10.	Beetle 216-8	10.5	1.2	Cytec
11.	LVT 325 Talc	170.5	7.2	Mineral Technologies
12.	Imsil A10	170.5	7.7	Unimin
	<b>Total</b>	<b>625.4</b>	<b>50.0</b>	
Total A + B		<b>1158.8</b>	<b>100.00</b>	
	PVC	22%	Pencil Hardness	3H
	VOC (lb/gal)	1.37	Mandrel Bend	1" Pass
	Wt Solids	88%	Set to Touch	6 hrs
	Vol Solids	80%	Visc. A side	2112 cPs
	Stoichiometry	1:1	Visc. B side	4750 cPs



FORMULATION II: GLOSS ENAMEL STARTING POINT FORMULATION BASED ON LIQUID EPOXY

Nb.	A Side	Pounds	Gallons	Supplier
1.	Liquid Epoxy	378.9	39.13	Dow, Shell, Vantico
2.	MIBK	19.1	2.87	
3.	Xylene	57.4	8.01	
	<b>Total</b>	<b>455.4</b>	<b>50.0</b>	
B Side				
4.	Ancamide 2634	163.6	19.80	Evonik
5.	Ancamine 1767	18.2	2.25	Evonik
6.	Ancamine K54	8.3	1.01	Evonik
7.	Xylene	18.1	2.53	
8.	Nevchem LR	31.9	3.75	Neville
9.	Aromatic 100	25.5	3.47	
10.	n-Butanol	26.0	3.85	
11.	Byk 307	2.6	0.30	Byk Chemie
12.	Modaflow	2.6	0.31	Solutia
13.	TiPure R960	190.0	5.84	DuPont
14.	MP 40-27	80.0	3.36	Mineral Technologies
15.	Barytes	130.0	3.54	Cimbar
	<b>Total</b>	<b>696.8</b>	<b>50.0</b>	
Total A + B		1152.2	100.00	
	PVC	18%	A Side Viscosity	240 cP
	VOC (lb/gal)	1.8	B Side Viscosity	1650 cP
	Wt Solids	84%	Mixed Viscosity	1300 cP
	Vol Solids	75%	Pot Life	3 h
	Stoichiometry	1:05	Thin Film Set Time	6.5 h
			Hard Dry Time	9.5 h



FORMULATION III: FAST DRY GLOSS ENAMEL STARTING POINT FORMULATION BASED ON LIQUID AND SOLID EPOXY

Nb.	A Side	Pounds	Gallons	Supplier
1.	Liquid Epoxy (EEW 190)	170.0	17.6	Dow, Resolution, Huntsman
2.	1001X75	255.0	28.0	Dow, Resolution, Huntsman
3.	Anti-terra U80	4.2	0.5	Byk Chemie
4.	Byk 307	4.2	0.5	Byk Chemie
5.	Xylene	51.0	7.1	
6.	MIBK	89.8	13.4	
7.	TiPure R 960 TiO <sub>2</sub>	180.0	5.5	DuPont
8.	Talc MP 40-27	90.0	3.8	Mineral Technologies
9.	Imsil A 10 Crystalline Silica	80.0	3.6	Unimin
	<b>Total</b>	<b>924.2</b>	<b>80.0</b>	
B Side				
10.	Ancamide 2634	111.0	13.0	Evonik
11.	Ancamine K54	5.8	0.7	Evonik
12.	Benzyl alcohol	25.5	2.9	
13.	Butanol	22.4	3.3	
	<b>Total</b>	<b>164.8</b>	<b>20.0</b>	
Total A + B		<b>1089.0</b>	<b>100.00</b>	
	PVC	21%		
	VOC (lb/gal)	2.76		
	Wt Solids	75%		
	Vol Solids	61%		
	Stoichiometry	105%		

FORMULATION IV: CATHODIC DISBONDMENT AND HOT WATER RESISTANCE FORMULATION

Nb.	A Side	kg	litres	Supplier
1.	Epon 828	327.39	33.81	Dow, Resolution, Huntsman
2.	Nuosperse 657	5.24	0.63	Huls
3.	Xylene	72.03	10.05	
4.	MIBK	32.74	4.90	
5.	Aromatic 100	72.03	9.81	
6.	TiPure R 960 TiO <sub>2</sub>	130.96	4.02	DuPont
7.	Nytral 300 talc	399.41	16.79	NYCO
	<b>Total</b>	<b>1039.79</b>	<b>80.0</b>	
<b>B Side</b>				
8.	Ancamide 2634	160.21	20.0	Evonik
	<b>Total A + B</b>	<b>1200.00</b>	<b>100.00</b>	
	PVC	29%		
	VOC (lb/gal)	2.09		
	Wt Solids	83%		
	Vol Solids	71%		
	Stoichiometry	1		



FORMULATION V: ANTICORROSIVE METAL PRIMER FORMULATION

Nb.	A Side	Pounds	Gallons	Supplier
1.	Liquid Epoxy (EEW 190)	282.4	29.17	Dow, Resolution, Huntsman
2.	Anti-terra U80	2.6	0.31	Byk Chemie
3.	Modaflow	7.7	0.92	Solutia
4.	Xylene	55.1	7.68	
5.	MPK	28.2	4.22	
6.	MP 40-27 Talc	179.4	7.70	Mineral Technologies
	<b>Total</b>	<b>555.3</b>	<b>50.0</b>	
<b>B Side</b>				
7.	Ancamide 2634	128.8	15.58	Evonik
8.	Nevchem LR	25.6	3.01	Neville
9.	Benzyl alcohol	19.2	2.20	Noveon
10.	n-Butanol	85.2	12.66	
11.	Red Iron Oxide	50.0	1.16	Bayer
12.	SZP 391	50.0	1.99	Halox
13.	Imsil A8 Silica	294.9	13.38	Unimin
	<b>Total</b>	<b>653.7</b>	<b>50.0</b>	
<b>Total A + B</b>		<b>1209.0</b>	<b>100.00</b>	
	PVC	34%		
	VOC (lb/gal)	1.96		
	Wt Solids	84%		
	Vol Solids	72%		

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