Product information

ANCAMIDE® 2443

Curing Agent

DESCRIPTION

Ancamide 2443 curing agent is a modified amidoamine designed to be used with liquid epoxy resin. Its extremely low viscosity enables the development of high-performance, 100% solids formulations that can be applied via conventional and airless spray equipment without the use of diluents. Ancamide 2443 is an exceptional formulating tool.

TYPICAL PROPERTIES

Property	Value	Unit	Method
Appearance	Amber liquid		
Colour	7	Gardner	ASTM D 1544
Viscosity @ 77°F	30	cP	ASTM D 445-83, Brookfield, RVTD, Spindle 4
Amine Value	530	mg KOH/g	Perchloric Acid Titration
Specific Gravity @ 77°F	0.970		ASTM D 1475-85
Weight per Gallon	8.10		
Flash Point	>200	°F	Seta Flash Closed Cup
Equivalent Wt/{H}	86		
Recommended use Level	45	PHR	EEW=190

ADVANTAGES

- Very low viscosity
- Excellent adhesion to poorly prepared substrates
- Excellent humidity and corrosion resistance
- Good film appearance and no amine blush
- Long pot life
- Plasticizer-free
- Enables a good balance of properties

APPLICATIONS

- Penetrating sealers for poorly prepared steel and concrete surfaces
- Modifier for polyamides to provide increased solids volume and VOC reduction
- High solids and 100% solids corrosion resistant coating

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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 hunidity in tightly closed containers.

STORAGE AND HANDLING

Refer to the Safety Data Sheet for Ancamide 2443 curing agent.

TYPICAL CURE SCHEDULE

7 days at ambient temperature.

TYPICAL HANDLING PROPERTIES*

Property	Value	Unit	Method
Thin Film Set Time @ 77°F	11.5	h	BK-Recorder, 6 mil wet film thickness
Gel Time (150g mix at 77°F)	250	min	ASTM D 2471-71
Peak Exotherm	185	°F	ASTM D 3418-82
Time to Peak Exotherm	250	min	

*Ancamide 2443 curing agent formulated with standard Bisphenol-A based (DGEBA, EEW=190) epoxy resin.

SUPPLEMENTARY INFORMATION

Ancamide 2443 curing agent is an ultra-low-viscosity, modified amidoamine containing no plasticizers or solvents, thus enabling the formulator to develop 100% solids coatings which can be applied via brush, roller or with conventional spray equipment. When used with liquid epoxy resins, the low-mix viscosity of the system allows Ancamide 2443 curing agent to be used as a penetrating sealer or as a direct-to-metal primer without the addition of cosolvents. The product has good blush resistance and provides excellent adhesion to poorly prepared surfaces. It is ideal for sealing in rusty steel or for filling voids in concrete surfaces. Ancamide 2443 curing agent also exhibits a long pot life and offers an extensive recoat window.

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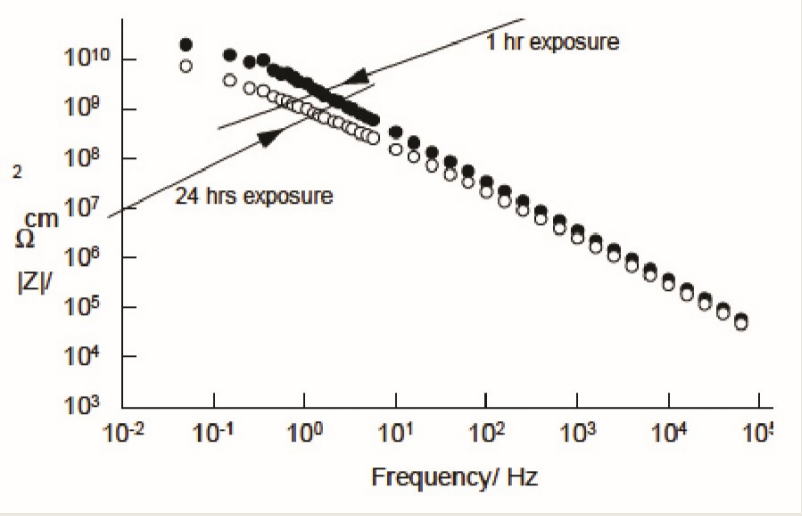
STARTING POINT FORMULATIONS

Ancamide 2443 curing agent can be used to develop high-performance, 100% solids coatings. Formulation 2443S1 is a starting point formulation developed to demonstrate the excellent adhesive properties of the curing agent when applied to both concrete and rusted steel substrates. Formulation 2443S1 contains both Epodil® L (Epodil LV5 is a new alternative offed by Evonik) and Epodil 759 diluents in order to maintain the low application viscosity (180 cP). The addition of Ancamine® K54 curing agent can also be used to improve the set time of Ancamide 2443 formulations. Typical usage levels for Ancamine K54 curing agent are in the range 2.5-5.0% by weight (based on the Ancamide 2443 curing agent level). Additionally, additives such as FC430 (3M) or Byk 354 can be used to improve flow and surface appearance.

Formulation 2443P1 is a starting point formulation developed for use as a 100% solids, direct-to-metal primer. The formulation has a low initial mix viscosity (1600 cps) and a pot life of 2.25 hours. Preliminary evaluations of Formulation 2443P1 have been conducted using electrochemical impedance spectroscopy (EIS), see Figure 1.

FIGURE 1: ANCAMIDE 2443P1—EIS ANALYSIS



Results obtained show coatings based on Formulation 2443P1 have the potential to provide excellent corrosion resistance. The pore resistance of coatings applied to grit blasted steel (2.5 mil, DFT) was in excess of 1010 ohms following 24 hours exposure to the electrolyte solution (1M NaCl). This value is comparable to results obtained for many solvent-borne polyamide coatings used in industrial maintenance primers. The test primers also exhibited excellent humidity resistance. After 1000 hours of continuous exposure in the Cleveland humidity cabinet, the test panels remained free from field blisters and other surface defects.

Formulation 2443 ACP2 is a starting point formulation developed as a high-solids anti-corrosive primer. Evaluations of this primer were completed using salt spray (ASTM B117) and prohesion (ASTM G85-A5) on Bondrite 952 panels with 3-4 mil DFT with very successful results, shown below in Tables 3 and 4.

TABLE 3: SALT SPRAY RESULTS

Salt Fog	Blisters*	Field*	Scribe**
500 hours	None	10	10
2000 hours	Few	9	9

* ASTM D 714
** ASTM D 1654

TABLE 4: PROHESION RESULTS

Cyclic Prohesion	Blisters
500 hours	None
2000 hours	None

ADHESION TESTS

A severely rusted bridge girder was used as the source for steel test panels. Prior to application of Formulation 2443S1, test samples of approximately 8” x 5” in size were cut and power cleaned using cut brushes. The clear sealer was applied to the rusty steel via brush and allowed to cure at room temperature for 72 hours. A stainless steel epoxy finish (Epon 1001/polyamide curing agent) was applied over the sealer at a dry film thickness of 2.0-2.5 mils. Following a 10-day cure schedule (72°F/50% RH), aluminum dollys were fixed to the top coat using an epoxy adhesive. After a further 3 days cure, the dollys were pulled using an Elcometer test apparatus, in accordance with ASTM methodology (ASTM D 4541). Resultant bond strengths were in excess of 750 psi, indicating that the mode of failure occurs within the rusted layers of the steel. No problems were observed relating to intercoat adhesion failure between sealer and stainless steel finish, and no breakdowns were seen in the sealer coat itself.

Formulation 2443S1 was also applied over poorly prepared concrete. Results of these adhesion tests indicate that failure occurs at the concrete substrate. Bond strength values of 490 psi were recorded.

Figures 2 and 3 show the results summarized in Tables 3 and 4.

FIGURE 2: SALT FOG RESULTS

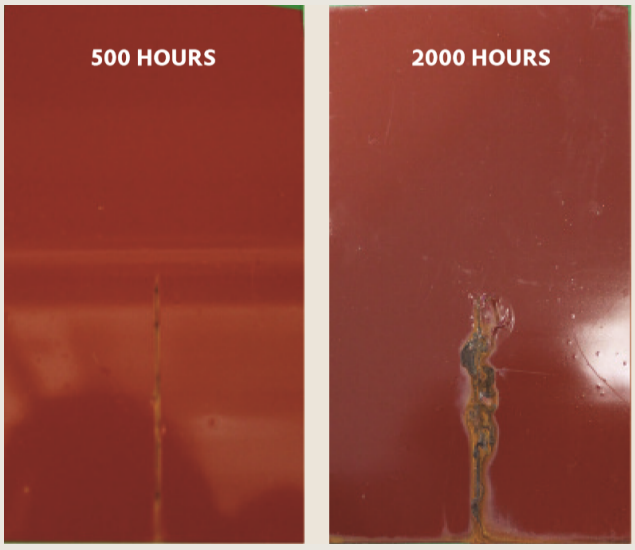


FIGURE 3: CYCLIC PROHESION RESULTS

ANCAMIDE 2443 CURING AGENT STARTING POINT FORMULATIONS

TABLE 3: FORMULATION 2443S1— PENETRATING SEALER (CLEAR COAT)

Nb.	A-Component	Supplier	Pounds	Gallons
1.	Ancamide 2443	Evonik	229.7	29.00
2.	A-1100 (silane)	Witco	8.1	1.02
3.	Epodil L*	Evonik	26.1	3.00
4.	Ancamine K54	Evonik	8.1	1.00
	Total (A Side)		**272.0**	**34.02**
Nb.	**B-Component**			
5.	Liquid Epoxy Resin	Dow, Resolution	426.8	44.00
6.	Epodil 759	Evonik	126.0	17.00
7.	Epodil L*	Evonik	58.0	6.67
8.	Byk 307	Byk Chemie	2.1	0.23
	Total (B Side)		**612.9**	**67.90**

TYPICAL PROPERTIES

Vol Solids (%)	100.0	Initial Viscosity (cP)	180.0
Mix Ratio (A:B,vol)	1:2	Adhesion (dolly pull off)	
PVC (%)	0.0	Rusted Steel (psi)	790
VOC (lb/gal)	0.0	Concrete (psi)	490
Pot Life (h)	5.0		

TABLE 4: FORMULATION 2443P1— 100% SOLIDS —DIRECT TO METAL PRIMER

Nb.	A-Component	Supplier	Pounds	Gallons
1.	Ancamide 2443	Evonik	154.9	19.55
2.	Cabosil TS720**	Cabot	9.2	0.58
3.	Wollastocoat 10ES	NYCO	200.0	8.26
4.	Zeospheres 400	3M	100.0	5.45
5.	Halox SZP-391	Halox	50.0	1.99
6.	Red Iron Oxide J-310	Bayer	50.0	1.20
7.	Byk 354	Byk Chemie	0.6	0.07
8.	Epodil L*	Evonik	21.3	2.44
	Total (A Side)		**586.0**	**39.57**
Nb.	**B-Component**			
9.	Liquid Epoxy Resin	Dow, Resolution	309.3	31.89
10.	Epodil 759	Evonik	57.0	7.69
	Total (B Side)		**366.3**	**39.58**

* Epodil LV5 is now offered by Evonik instead of Epodil L.
** Evonik‘s Aerosil R202 may also be used.

TYPICAL PROPERTIES

Vol Solids (%)	99.9	Initial Viscosity (cP)	1600
Mix Ratio (A:B,vol)	1:1	Dry to touch (h)	>24
PVC (%)	22.1	Wt per gallon (lb/gal)	12.03
VOC (lb/gal)	0.03		
Pot Life (h)	2.25		

TABLE 5: FORMULATION 2443 ACP2 — HIGH SOLIDS ANTI-CORROSIVE PRIMER

Nb.	Raw Materials — A Side	Supplier	Pounds	Gallons
1.	Liquid Epoxy resin , EEW 188	Olin Corporation	309.3	31.89
2.	Epodil® 759	Evonik	57.0	7.69
	Total (A Side)		**366.3**	**39.58**
Nb.	**Raw Materials — B Side**			
3.	Ancamide® 2443	Evonik	155	19.55
4.	Aerosil® 200	Evonik	9.2	0.58
5.	Wollastocoat 10 ES	Nyco	200	8.26
6.	Zeeospheres G 400	Zeeospheres	100	5.45
7.	Halox SZP-391	ICL	50	2.0
8.	Red Iron Oxide	Lanxess	50	1.20
9.	BYK 354	Byk Chemie	0.6	0.07
10.	Epodil® LV-5	Evonik	21.3	2.44
	Total (B Side)		**586**	**39.55**

FORMULATION PROPERTIES

VOC (lb/gal)	0.03	Mix Ratio	1:1
Volume Solids (%)	99.9	PVC (%)	22.1
Density (lb/gal)	12.03	Mixed Viscosity (cP)	1600

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