

Product information

ANCAMINE[®] 2368

Curing Agent

DESCRIPTION

Ancamine 2368 curing agent is a low-color, lowviscosity cycloaliphatic amine adduct intended for use with liquid epoxy resins. Ancamine 2368 imparts rapid development of physical properties at ambient and low temperatures and yields high strength formulations that are resistant to alcohols, solvents and acids. These properties make Ancamine 2368 curing agent ideal for formulating flooring and grouts.

TYPICAL PROPERTIES

Property	Value	Unit	Method
Appearance	Pale Yellow Liquid		
Color	2	Gardner	ASTM D 1544-80
Viscosity			ASTM D-445-83, Brookfield, RVTD, Spindle 4
@ 77°F	200	cps	
@ 50°F	1,110	cps	
Amine Value	8.4	mg KOH/g	Perchloric Acid Titration
Specific Gravity @ 77°F	1.04	g/ml	ASTM D 1475-85
Flash Point (closed cup)	215	°F	Seta Flash Closed Cup
Equivalent Wt/{H}	99		
Recommended use Level	52	phr	EEW=190 resin

ADVANTAGES

- Rapid cure and property development at ambient and low temperatures
- High strength and modulus
- Low viscosity
- Good chemical resistance
- Good resistance to waterspotting

APPLICATIONS

- Self-leveling, trowelable and pebble finish flooring
- Concrete adhesives and repair mortars
- Chemically resistant linings
- High solids coatings

STORAGE AND HANDLING

Refer to the Safety Data Sheet for Ancamine 2368 curing agent.

SHELF LIFE

At least 12 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.

TYPICAL CURE SCHEDULE

2 to 7 days at ambient temperature.

TYPICAL HANDLING PROPERTIES

Property	A*	B*	Unit	Method
Mixed Viscosity @ 77°F	1,400	590	cPs	ASTM D-445-83, Brookfield, RVTD, Spindle 4
Gel Time				Techne GT- 4 Gelation Timer
150 g mix @ 77°F	32	35	min	
150 g mix @ 50°F	126	184	min	
Thin Film Set Time				BK Drying Recorder
@ 77°F	5.3	6.0	h	
@ 50°F	11	16	h	
@ 40°F	16	18	h	
Peak Exotherm (150 g mix @ 77°F)	250	270	°F	ASTM D 2471-71

TYPICAL PERFORMANCE

Property	A*	B*	Unit	Method
(7 day cure @ 77°F)				
Glass Transition Temperature	136	136	°F	ASTM D 3418-82
Compressive Strength @ Yield	14,000	11,900	psi	ASTM D 695-85
Compressive Modulus	384	336	thousand psi	ASTM D 695-85
Tensile Strength	8,000	8,200	psi	ASTM D 638-86
Tensile Modulus	282	254	thousand psi	ASTM D 638-86
Tensile Elongation	3.3	4.0	%	ASTM D 638-86
Flexural Strength	14,600	15,200	psi	ASTM D 790-86
Flexural Modulus	535	467	thousand psi	ASTM D 790-86
Hardness	83	83	Shore D	ASTM D 2240-86
60° Specular Gloss	119	-		ASTM D 523-85
Abrasion Resistance Weight Loss @ 1,000 cycles with wheel no. 10	-	0.071	gm	ASTM D 4060-90
Mar Resistance	-	0.80	kg	ASTM D 5178-91

* Ancamine 2368 formulated with DGEBA (EEW=190) resin.

* Ancamine 2368 with 90% DGEBA resin (EEW=190) and 10% Epodil® 748 diluent (C₁₂-C₁₄ alkyl glycidyl ether) blend.

SUPPLEMENTAL DATA

CHEMICAL RESISTANCE: Chemical immersion studies following ASTM D543 were performed on coupons using DGEBA (EEW=190) resin cured with Ancamine 2368 curing agent for 7 days at 77°F. Table 1 shows the percent weight change after 3 days and 28 days in various chemicals at 77°F.

Spillage resistance studies were conducted on Ancamine 2368 curing agent formulated with a 90% DGEBA resin (EEW=190) and 10% Epodil 748 diluent (C₁₂ - C₁₄ alkyl glycidyl ether) blend. Samples were cured for 7 days at 77 °F; three samples were tested for each reagent. The immersion/recovery schedule for the testing is shown in Table 2. Percent weight change and Shore D hardness were measured after each of the immersion periods. Hardness retention is relevant in flooring applications where it indicates the ability of the floor to support traffic after exposure. Results of this study are presented in Table 3.

These studies show that Ancamine 2368 curing agent imparts good chemical resistance to a variety of solvents, inorganic acids and bases. The chemical resistance of Ancamine 2368-cured formulations can be optimized for specific chemicals using different resin blends, such as DGEBA and multifunctional novolac resins. For information on the chemical resistance of many other Air Products curing agents, please refer to Air Products' brochure entitled "Chemical Resistance for Ambient Cure Epoxy Formulations" (Pub. No. 125-9326).

TABLE 1: CHEMICAL RESISTANCE FOR ANCAMINE 2368 FORMULATION % WEIGHT CHANGE AS A FUNCTION OF TIME - CONTINUOUS IMMERSION

Reagent	Ancamine 2368/DGEBA Resin	
	3 day % Weight Change	28 day % Weight Change
Deionized Water	0.36	1.24
Methanol	10.47	9.74
Ethanol	2.39	7.47
Toluene	0.79	4.85
Xylene	0.01	0.90
Butyl Cellosolve	1.46	7.82
MEK	24.06	17.41
10% Lactic Acid	1.10	3.81
10% Acetic Acid	3.10	9.31
70% Sulfuric Acid	0.26	0.53
98% Sulfuric Acid	Destroyed < 24 hours	
50% Sodium Hydroxide	-0.10	-0.10
10% Sodium Hypochlorite	-0.10	0.71

Note: Samples were cured for 7 days at 77 °F before testing. They were tested in accordance with ASTM D543-84.

TABLE 2: SPILLAGE RESISTANCE TEST METHOD SCHEDULE

Imm: Castings of 1/8" thickness are immersed for specified time period.

Test: Sample is then removed, weighed, and hardness tested immediately. Sample is then allowed to recover for specified time before re-immersion.

3 hr imm → test → 24 hr recover → 24 hr imm → test → 24 hr recover → 3 day imm → test →
 3 day recover → 7 day imm → test → 7 day recover → 28 day imm → test → 7 day recover →
 90 day imm → test

TABLE 3: SPILLAGE RESISTANCE FOR ANCAMINE 2368 WITH 90% DGEBA / 10% EPODIL 748 % WEIGHT CHANGE AND SHORE D HARDNESS AS A FUNCTION OF TIME

Reagent	Initial	After 3 hr		After 24 hr		After 3 days		After 7 days		After 28 days		After 90 days	
	Hard	% wt.	Hard	% wt.	Hard	% wt.	Hard	% wt.	Hard	% wt.	Hard	% wt.	Hard
10% Acetic Acid	83	0.34	81	1.34	78	2.75	73	4.55	68	7.83	65	12.2	49
Toluene	83	-0.02	82	0.26	80	2.63	74	7.85	63	DESTROYED			
Xylene	83	0.00	80	0.04	80	0.40	80	1.39	78	3.59	74	9.42	60
Trichloroethane	83	-0.01	85	0.04	81	0.18	81	0.58	80	1.83	80	2.83	80
Methanol	83	2.35	68	6.50	45	12.4	27	11.6	26	10.6	17	18.9	17
Ethanol	83	0.43	79	1.70	71	3.47	65	5.58	59	10.5	54	7.95	46
Butyl Cellosolve	83	0.04	81	0.66	77	2.27	74	4.42	68	9.69	58	DESTROYED	
MEK	83	1.12	76	9.41	46	18.7	36	17.2	35	17.7	27	6.27	27
Skydrol	83	0.05	81	0.02	81	0.00	80	0.02	80	0.01	80	-0.07	80
70% Sulfuric Acid	83	0.11	81	0.16	81	0.28	81	0.35	81	0.56	81	0.72	81
98% Sulfuric Acid	83	-26.2	73	DESTROYED									
Deionized Water	83	0.07	80	0.18	80	0.43	80	0.76	80	1.31	80	1.82	79
50% Sodium Hydroxide	83	-0.02	82	-0.04	82	-0.06	82	-0.05	82	-0.08	82	-0.14	81
Bleach	83	0.05	82	0.16	80	0.35	78	0.57	78	0.47	78	0.33	77

Note: Samples cured for 7 days at 77°F before testing

CURE SPEED: The thin film set time of Ancamine 2368 curing agent with DGEBA resin in a 3 mil film is 5.3 hours at 77°F, and 16 hours at 40°F. Even using a 90% DGEBA resin/10% Epodil 748 diluent blend, the thin film set time is 6.0 hours at 77°F and 18 hours at 40°F. To speed up thin film set time and hardness development at ambient temperatures, Ancamine 2368 can be accelerated with aliphatic amine curing agents such as 10% Ancamine 2089M, 10% Ancamine 2432, 10% Ancamine 1856 or 10% Ancamine 2205 curing agent. Either 10% Ancamine 2089M or Ancamine 2432 curing agent is recommended for low temperature (< 55°F) acceleration.

HARDNESS DEVELOPMENT: Gel time defines the development of cure in mass, and thin film set time predicts film cure. These measurements may not accurately predict development of hardness. König pendulum hardness was measured as a function of cure time at 77°F and 50°F for 10 mil coatings formulated with Ancamine 2368 curing agent and DGEBA resin. Shore D hardness development was also measured as a function of 40°F cure time for 1/4" thick disks. Results are presented in Table 4.



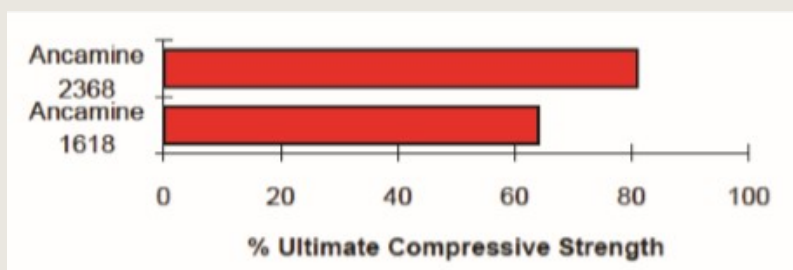
TABLE 4: ANCAMINE 2368 HARDNESS DEVELOPMENT

Number of Days Cure	1	3	7	Method
77°F Cure König Pendulum Hardness	88	117	130	
50°F Cure König Pendulum Hardness	13	78	105	
40°F Cure Shore D Hardness	<10	62	65	ASTM D 2240-86

Note: Ancamine 2368 was formulated with DGEBA (EEW=190) resin.

Property development is faster than with most standard cycloaliphatic curing agents such as Ancamine 1618 curing agent. Figure 1 shows the strength development of a selfleveling flooring formulation containing Ancamine 2368 vs. that containing Ancamine 1618 curing agent when cured at 77°F.

FIGURE 1: 24 HOUR COMPRESSIVE STRENGTH DEVELOPMENT



The fast cure and rapid hardness development of formulations cured with Ancamine 2368 curing agent make it ideal for flooring, mortars and grouts applied at ambient or low temperatures.

WATERSPOT RESISTANCE: Ancamine 2368 curing agent formulated with a 90% DGEBA resin (EEW=190) and 10% Epodil 748 diluent (C₁₂-C₁₄ alkyl glycidyl ether) blend was tested for waterspot resistance. A ten mil film was cured for eight hours at 72°F and 55% relative humidity. After eight hours, a cotton ball saturated with water was placed on the film. The film was then placed in an incubator for 24 hours at 72°F and 90% relative humidity.

After this period, the film was examined for white spots. The Ancamine 2368-based formulation showed an absence of spots, indicating good waterspot resistance at ambient conditions. However, under more adverse low temperature, high humidity cure conditions, Ancamine 2368-based formulations may be subject to waterspotting.

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