

ANQUAMINE® 735 Curing Agent**DESCRIPTION**

Anquamine 735 curing agent is a water-based curing agent specifically designed for standard liquid epoxy resin. It is a cost-effective material for high-film build concrete coatings and is particularly suitable for water-based self leveling systems. Anquamine 735 curing agent can easily emulsify standard liquid epoxy resins without the need for emulsifiers or pre-emulsified epoxy resins. Formulations based on Anquamine 735 curing agent enable highly decorative functional floors without the requirement of plasticizers or solvents.

BENEFITS

- Cost effective
- Rapid hardness development
- Excellent adhesion to concrete
- Low color and good yellowing resistance
- Excellent surface appearance
- Zero VOC

APPLICATIONS

- Self-leveling floors
- Mortars
- Grouts

STORAGE AND HANDLING

Refer to the Safety Data Sheet on Anquamine 735 curing agent.

TYPICAL CURE SCHEDULE

- 2 to 7 days at ambient temperature.

TYPICAL PROPERTIES

Appearance	Amber Liquid
Color¹ (Gardner)	<5
Viscosity² @ 77°F (cPs)	5-15,000
Amine Value³ (mg KOH/g)	240
Specific Gravity @ 77°F	1.05
Total Solids Content (wt %)	55
Equivalent Wt/{H}	200
Recommended Use Level, (phr EEW 190)	100

TYPICAL HANDLING PROPERTIES*

Pot Life	35-50 min
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TYPICAL PERFORMANCE*

1 day Shore D (25°C, 55% RH)	67
7 day Shore D (25°C, 55% RH)	80
Compressive Strength⁴ after 28 days (psi)	5800

* Self-leveling starting point formulation.

- (1) ASTM D 1544-04
- (2) Brookfield RV, Spindle 34
- (3) Perchloric Acid Titration
- (4) ASTM C579

SUPPLEMENTARY DATA

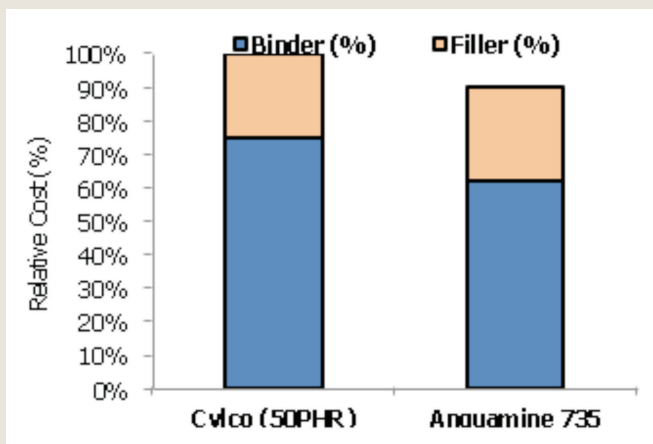
ANQUAMINE 735 CURING AGENT CHARACTERISTICS AND APPLICATIONS:

Anquamine 735 curing agent has been specifically designed for cost effective high film build concrete protection, such as self-leveling flooring systems, typically applied at 1-3 mm coating thickness. Anquamine 735 self-leveling system enables smooth surfaces on uneven substrates, high abrasion resistance and good chemical resistance for industrial floor applications.

COST-IN-USE COMPARISON — WATERBORNE SELF LEVELING:

Epoxy self-leveling flooring is commonly used to protect concrete as it offers optimum handling properties and maximum protection of the concrete in terms of durability, abrasion and chemical resistance. In self-leveling systems based on Anquamine 735 curing agent the amount of binder in the formulation can be reduced compared to solvent free systems and yield high performance, thus providing a cost effective, optimum handling and high performance concrete protection system.

Anquamine 735 curing agent is ideal to formulate a self leveling system to provide optimum cost performance concrete protection. In solvent free systems an excess amount of binder is required to offer self-leveling properties, which contributes to high material cost. In contrast, a self-leveling system based on Anquamine 735 curing agent can be formulated to offer optimum protection with a reduced amount of binder. Flow characteristics will be adjusted by incorporation of water, thereby reducing the coating cost as well. Anquamine 735 self-leveling systems can offer a cost-in-use advantage over solvent free systems of approximately 20%.



APPLICATION ROBUSTNESS

To enable high performance and durability, the adhesion and resistance to delamination and deformation have been tested on a variety of substrates. The photographs attached display a test method under which a formulated self-leveling system is applied in 39 x 2in, 1/8 inch thick strips (approximately 250g of formulation) to a polyethylene sheet. The non-porous nature of this substrate and the consequent poor adhesion provides a methodology where any system shrinkage can be visually determined. These strips are then measured for deviation from horizontal, and the length of the strip is measured with a flexible measuring tape. The results in Table 1 compare the Anquamine 735 formulation to a system that shows shrinkage on this substrate. The durability of the Anquamine 735 self-leveling formulation indicates low internal stress development within the system, therefore enabling robust flooring with a resultant high adhesion to concrete substrate.

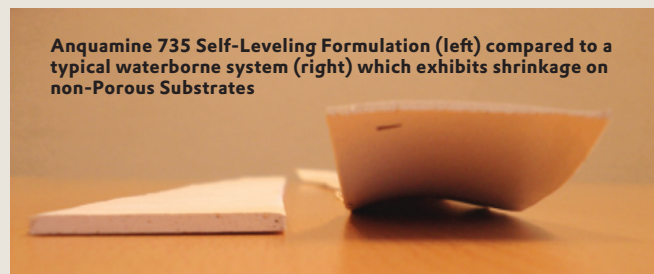


TABLE 1: RESULTS OF APPLICATION ON NON-POROUS SUBSTRATE

	Displacement from Horizontal	Length
Anquamine 735	<1/24 in	39 in
WB Self Leveler	1 in	37.5 in

HIGHLY DECORATIVE AND FUNCTIONAL FLOORING SYSTEMS:

Self leveling floors based on Anquamine 735 curing agent provide a satin/matte finish, thereby reducing the visibility of floor defects and decreasing scratch sensitivity. However, the surface is highly adaptable and can be modified to produce highly decorative gloss surface appearances. Due to the inherent good overcoat ability, the self-leveling floor can be readily coated with a transparent sealer or topcoat to produce a high gloss or decorative finish with improved chemical resistance and cleanability. The surface can be easily modified by broadcasting sand or pigment effects and sealed with a transparent topcoat such as an industrial two component polyurethane coating, waterborne polyurethane / acrylic hybrid dispersions (e.g. Hybridur® 870 dispersion), or two component waterborne epoxy systems (e.g., those based on Anquawhite® 100 curing agent), to offer highly decorative or non-slip flooring.

PHYSICAL PROPERTIES

TABLE 2: TYPICAL PROPERTIES OF SELF LEVELING FLOOR SYSTEMS

Physical Properties	Anquamine 735	Cycloaliphatic (50phr)
Surface Appearance	Satin / Matte	High Gloss
Compressive Strength (28 days)	5,800 psi	9,500 psi
Water Vapor Transmission (g/m ² s)	1.4 X 10 ⁻³	6.5 X 10 ⁻⁶
Adhesion to Damp Concrete	250 psi	50 psi
Impact Resistance	160 in/lbs	80 in/lbs
Abrasion Resistance (Taber C17)	300 mg	270 mg

Good compatibility has been found with a number of universal tinting systems commonly used in waterborne acrylic coatings and commercial pigment pastes such as Tint-Ayd® CW pigment concentrates (Elementis), Aquatone® Dispersions (Sun Chemicals) and Colortrend® and Chroma-Chem® colorants (Evonik). This compatibility allows for a wide color pallet, making systems based on Anquamine 735 curing agent very versatile and able to offer a highly decorative solution to concrete protection. The self-leveling formulation based on Anquamine 735 curing agent can be used with standard tinting systems to give decorative flooring of various colors.

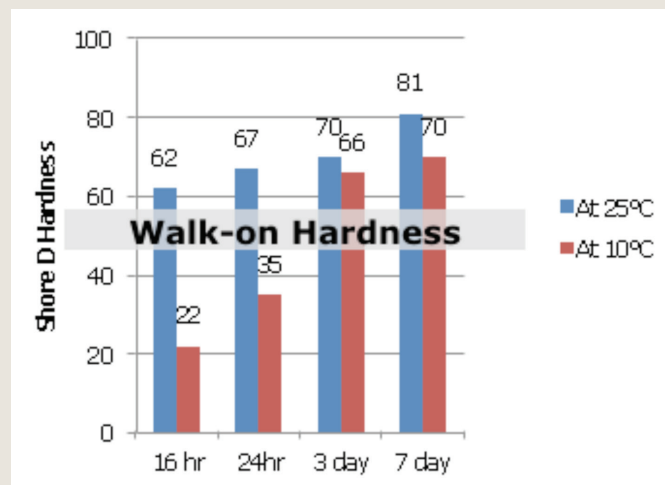
The Anquamine 735 curing agent based self-leveling system also offers a high level of protection to the substrate, protecting it from abrasion, impact and chemical attack. The following table shows the physical properties of a self leveling system based on Anquamine 735 curing agent compared to the typical properties of a solvent free cycloaliphatic system.

In addition, this system provides high resistance to impact, e.g. from falling heavy objects. Upon impact a 'dent', but no cracking, may occur so that concrete would be further protected without extensive repair work.

The water vapor transmission data indicates that a self-leveling system based on Anquamine 735 curing agent provides significantly increased permeability resulting in resistance to Osmotic blistering on concrete substrate with a high level of residual water (e.g. fresh concrete) or a high water table.

FAST RETURN TO SERVICE: The self-leveling flooring system based on Anquamine 735 curing agent offers very fast property development, allowing for a rapid return to service. The property development is demonstrated at 25°C and 10°C indicating that even at low temperatures the system will produce walk-on hardness quickly, Figure 1. The system can withstand light traffic after limited cure time allowing for the floor to be back in service or over coated with a further decorative surface finish much quicker than competitive technologies. This has the advantage of reducing the time a floor would be out of service, which has economic and logistical advantages.

FIGURE 1: SHORE D HARDNESS AS A FUNCTION OF TIME OF CURE FOR ANQUAMINE 735 SELF LEVELING FORMULATION



FORMULATION GUIDELINES

EPOXY RESINS: Anquamine 735 curing agent exhibits good compatibility with liquid epoxy resins based on modified or unmodified Bisphenol A or F. Reactive diluent modified epoxy resin can offer improved handling and formulating latitude within the self-leveling system. It is recommended to use a difunctional reactive diluent such as Epodil® 750 diluent or hexanediol diglycidyl ether at up to 15% to improve workability / handling while retaining property development and chemical resistance. Alternatively Epodil 748 diluents can be used showing good compatibility but reduction in cure speed and property development.

DEFOAMER/WETTING AGENT: Defoamers such as Surfynol DF75, Surfynol DF700, and BYK® 045 are very suitable for use in the self-leveling formulation to give optimum air release and surface properties. Zetasperse™ 1600 and Disperbyk® 190 can be used to effectively aid in wetting out pigments and increasing flow and leveling properties to give a system which yields good surface and flow properties.

Fillers: The filler package is optimized with the correct balance of sand grades to yield a system with good flow and leveling. Quartz sand and barytes are recommended to be used in combination with dry pigments or pre-dispersed pigment pastes to enable the desired performance and aesthetics. It is very important to have the correct particle size distribution of the fillers. Attention should also be paid to the shape and angularity of the fillers that are being used. These can greatly affect the flow and leveling of the system.

ANQUAMINE® 735 — CONCRETE PRIMER: This formulation is intended for use as a primer directly to concrete and is ideally suited as a primer for an Anquamine 735 self-leveler or mortar formulation.

CONCRETE PRIMER

Part A			
1. Curing Agent	Anquamine 735	Evonik	50.00
2. Diluent	Water	Local	10.00
			60.00
Part B			
3. Epoxy Resin	Bisphenol A DGE	Various	45.00
4. Epoxy Resin	Epodil 748	Evonik	5.00
			50.00
Part C			
5. Diluent	Water	Local	84.00

After mixing Part A and B the formulation is diluted to 40% solids with water and is ready to apply.

TECHNICAL DATA

Density - Part A / B / C	g/ml	1.05 / 1.03 / 1.00
- Mix	g/ml	1.03
Solid Content- - Part A / B / C	%	46 / 100 / 0
- Mix	%	40
Pot-life	Minutes	30
Mix Viscosity		
- Initial	cPs	150
- 15 minutes	cPs	530
- 30 minutes	cPs	3000
Dry-time (BK Recorder)		
- Tack Free	Hours	1.5
- Dry Hard	Hours	5.5
Persoz Hardness	24 hour	225
	7 days	270
	14 days	320

Anquamine® 735 2K Waterborne Self-Leveling Floor: This formulation is ideally suited as a self-leveling compound for concrete floors. For optimum performance it should be applied at 1-3mm in thickness.

Part A			Self-Leveling Floor – 2K
Curing agent	Anquamine 735	Evonik	10.00
Defoamer	BYK® 1770	BYK	0.50
TiO₂	Kronos® 2160	Kronos	3.80
Diluent	DI Water	Local	11.50
Filler	Cimbar 325	Cimbar	13.00
Filler	Sil-Co-Sil #106	US Silica	16.00
Filler	Quartz sand (~150µm)	US Silica	26.00
Filler	Quartz sand (Coarse ~300µm)	US Silica	19.00
Thixotropic Agent	Xanthum Gum (3% aq.)	Various	0.20
			100.00

Part A Manufacturing Procedure:

Charge components 1 and 2 and stir homogeneous at low shear
 Slowly add components 3 and partial 4 while increasing speed to 10-20 m/s for 10-15 min.
 Add remaining components at low shear rate.

Part B			
3. Epoxy resin	Bisphenol A DGE	Various	8.55
4. Epoxy resin	Epodil 748	Evonik	0.95
			109.50

After mixing Part A and B the formulation is ready to apply.

TECHNICAL DATA

Density (g/ml)	Part A	1.8	Gloss	60°C	5
	Part B	1.09	Shore D Hardness		
	Mix	1.56	1 Day	@10°C	35
Solid Content (wt %)	Part A	84	7 Days	@10°C	70
	Part B	100	1 Day	@25°C	62
	Mix	85	7 Days	25°C	81
Binder Content	%	13.6			
Filler : Binder Ratio		5.2:1			
Working Time	Mins	45			
Chem. Resistance	3% Acetic	No Effect	Stain Resistance	Red Wine	No Effect
24 hour, spot test	10% NaOH	No Effect	24 hour, spot test	Tea	No Effect
	Ethanol	No Effect		Coffee	No Effect
	Xylene	No Effect		Cola	No Effect
	Water	No Effect		Mustard	No Effect
				Ketchup	Slight stain
					Slight stain

ANQUAMINE® 735 TILE GROUT / ADHESIVE:

This formulation is ideally suited as a tile adhesive / grout or thixotropic filler and can be applied with a trowel or similar to a variety of substrates.

Part A			Grout
Curing agent	Anquamine 735	Evonik	7.7
Defoamer	Surfynol DF-75	Evonik	0.17
Diluent	Water	Local	7.3
Pigment	Kronos 2160	Kronos	1.00
Filler	Cimbar 325	Cimbar	21.9
Filler	Sil-Co-Sil #106	US Silica	11.6
Filler	Quartz Sand	US Silica	13.2
Filler	Fillite 500	OMYA	2.3
			65.17
Part B			
Epoxy resin	Bisphenol A DGE	Various	7.3
Epoxy resin	Epodil 748	Evonik	1.3
Epoxy resin	Epodil LV-5	Evonik	1.7
Surfactant	Surfynol 420	Evonik	0.13
Defoamer	Surfynol DF-75	Evonik	0.03
Thixotrope	Bentone SD-2	Benton	0.17
Pigment	Bayferrox 318	Lanxess	1.00
Cement	Portland Cement	Local	23.2
			33.83
Total			100.00

After mixing Part A and B for 2-3 minutes until the system is fully homogeneous the system is ready to apply.

TECHNICAL DATA

Density (g/ml)	Part A	1.84	Shore D Hardness			
	Part B	1.72		1 Day	@25°C	53
	Mix	1.81		2 Days	@25°C	73
Mix Solid Content	Weight %	88	Working Time	Minutes	30	
			Compressive Strength – 7 days	psi	4800	

ANQUAMINE® 735 TROWEL APPLIED MORTAR:

This formulation is ideally suited as a repair compound / mortar for concrete floors and can be applied with a trowel to give a smooth surface for further coating applications.

Part A			Mortar
Curing agent	Anquamine 735	Evonik	65.00
Defoamer	BYK® 045	BYK	5.20
Diluent	Water	Local	14.80
			85.00
Part B			
Epoxy resin	Bisphenol A DGE	Various	58.50
Epoxy resin	Epodil 748	Evonik	6.50
			65.00
Total			100.00
Part C			
Filler	Quartz Powder M600	Sibelco	50.00
Filler	Quartz Powder M31	Sibelco	200.00
Filler	Quartz Sand (0.2-0.4)	US Silica	350.00
Filler	Quartz Sand (0.7-1.2)	US Silica	300.00
Filler	Quartz Sand (1.0-1.7)	US Silica	100.00
			1000.00
Total			1150.00

After mixing Part A and B for 2-3 minutes until the system is fully homogeneous, Part C can be added to form the mortar system. Once Part C is fully dispersed in the Part A / B mixture the system is ready to apply.

TECHNICAL DATA

Density (g/ml)	Part A	1.05	Shore D Hardness			
	Part B	1.13		1 Day	@25°C	70
	Part C	2.66		7 Days	@25°C	80
	Mix	2.23				
Working Time	Minutes	45				

Epoxy Curing Agents and Modifiers

ANQUAMINE® 735 Curing Agent

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125-11-050-US