PROPEL YOUR PRODUCTIVITY WITH ASTONISHING CURE RATES.

Get back in service in under an hour with revolutionary ANCAMIDE® curing agent technology.

EVONIK
Leading Beyond Chemistry

PRIME. CURE. TOPCOAT. CURE.

Formulated for speed, productivity and high performance.

Our revolutionary high-performance polyamide curing agent technology is designed to allow applicators and end-users to improve productivity by providing ultra-fast drying times. This can save time and money by allowing a quick return to service in under an hour in factory and field applied coating projects.

The easy to use **ANCAMIDE® 2832** and **ANCAMIDE® 2864 curing agents** not only provide faster turnaround, but they also provide exceptional asset protection, aesthetics, high corrosion and chemical resistance, and excellent blush resistance for a high-quality finish even under the most demanding conditions.

SUPERIOR PERFORMANCE

Developed to provide high corrosion and chemical resistance and improve adhesion even on poorly prepared steel giving you a wider application window.

IMPROVED PRODUCTIVITY

Dries 3X faster than conventional polyamides for quick through cure, even at low temperatures. Rapid recoat in 15 minutes, saves time.

ECO-FRIENDLY PRODUCTS

Improves environmental, health and safety profile by eliminating harmful raw materials such as alkyl-phenols in favor of polyamides with low VOC.

BUILT WITH PURPOSE.

Epoxy coating systems are used in a variety of industries where long term asset protection is a requirement and they are applied under a variety of conditions. These include factory settings with consistent ambient temperatures and field application where the temperature and humidity conditions can fluctuate. ANCAMIDE® 2832 and 2864 curing agents are formulated for successful application under a broad range of conditions and superior performance and durability for optimum asset protection.

Factory-Applied Epoxy Coating Systems

- Outstanding surface appearance and aesthetics without topcoat dive back resistance or surface defects
- High corrosion and chemical protection
- Efficient wet-on-wet application
- Faster cure property development, 15 minutes, at ambient temperature
- Early recoat window with rapid multi-layer build up
- Low VOC, low emission, solvent-free

Recommendation:
ANCAMIDE® 2832

Field-Applied Epoxy Coating Systems

- Formulation optimized to ensure good surface appearance at low temperature and high humidity
- Faster drying times and improved blush resistance at ambient and low temperatures (5°C)
- High levels of cathodic and corrosion protection
- Developed for marine & protective coating application performance
- Satisfies environmental requirements

Recommendation:
ANCAMIDE® 2864

CHOOSE THE RIGHT CURING AGENT.

Let the specs help you decide.

ANCAMIDE® 2832

A modified polyamide curing agent developed to provide rapid through cure and long overcoatability with epoxy resins. It can be used in refinish, non-automotive Original Equipment Manufacturing (OEM) and wet-on-wet type applications in the protective coating market.

- Excellent inter-coat adhesion
- Topcoat 'dive back' resistance
- Good blush resistance

TYPICAL PROPERTIES	
Appearance	Dark Amber Liquid
Color ASTM D1544 (Gardner)	7 max
Viscosity @ 25°C, (mPa·s) Brookfield RVTD, Spindle 6	500-2000
Amine Value (mg KOH/g) Perchloric Acid Titration	325-450
Specific Gravity @ 21°	1.02
Equivalent Wt (active N-H)	156
Recommended Use Level (PHR) With bisphenol-A based epoxy resin (EEW=190)	82

TYPICAL HANDLING PROPERTIES	
Gel Time @ 25°C (min) Techne GT-5 Gelation Timer, 150 g mix	29
Thin Film Set Time@ 23°C (h) ASTM D 5895 - BK Drying Recorder, Phase 2/3, 60% RH	1:30/1:45
Thin Film Set Time@ 5°C (h) ASTM D 5895 - BK Drying Recorder, Phase 2/3, 60% RH	–
Wet-on-Wet Topcoat Time	15-30 minutes
Shore D 25°C Day 1/7	68
Tg °C 7 day, Second Scan	47
Persoz Pendulum Hardness 7d @ 23°C (s) ASTM D 4366	302
Carbamation Resistance **5°C /23°C (Scale 1-5, 5=best)** ISO 2812 (wet patch method), after 24 hrs @ applied temperature	5
MEK Double Rubs 24 hour @ 5°C	–
Shelf Life Store in an original sealed container at ambient temperature. Store away from excess heat and humidity.	At least 12 months from manufactured date

ANCAMIDE® 2864

The next generation modified polyamide epoxy curing agent for high-performance, corrosion resistant coatings. The curing agent exhibits low viscosity and fast through-cure with good blush resistance at both ambient and low temperature (5°C) conditions.

- Fast through-cure
- Good corrosion resistance
- Excellent blush resistance
- Fast mechanical property development

TYPICAL PROPERTIES	
Appearance	Clear Amber Liquid
Color ASTM D1544 (Gardner)	≤8
Viscosity @ 25°C, (mPa·s) Brookfield RVTD, Spindle 6	1200-2500
Amine Value (mg KOH/g) Perchloric Acid Titration	315-350
Specific Gravity @ 21°	1.04
Equivalent Wt (active N-H)	135
Recommended Use Level (PHR) With bisphenol-A based epoxy resin (EEW=190)	65

TYPICAL HANDLING PROPERTIES	
Gel Time @ 25°C (min) Techne GT-5 Gelation Timer, 150 g mix	32
Thin Film Set Time@ 23°C (h) ASTM D 5895 - BK Drying Recorder, Phase 2/3, 60% RH	2.5/4.0
Thin Film Set Time@ 5°C (h) ASTM D 5895 - BK Drying Recorder, Phase 2/3, 60% RH	7/13
Wet-on-Wet Topcoat Time	–
Shore D 25°C Day 1/7	–
Tg °C 7day, Second Scan	–
Persoz Pendulum Hardness 7d @ 23°C (s) ASTM D 4366	260
Carbamation Resistance 5°C /23°C (Scale 1-5, 5=best) ISO 2812 (wet patch method), after 24 hrs @ applied temperature	4/4
MEK Double Rubs 24 hour @ 5°C	>200
Shelf Life Store in an original sealed container at ambient temperature. Store away from excess heat and humidity.	At least 24 months from manufactured date

ANCAMIDE® 2832 Curing Agent

Technical Details

ANCAMIDE® 2832 curing agent is a medium viscosity, modified polyamide solution supplied in butanol solvent. Used in epoxy primers, it can be top coated with urethane, acrylic urethane and slower versions of polycarbamide, resulting in outstanding surface appearance, within 15-30 minutes after a primer is applied.

INTER-COAT ADHESION AND CORROSION RESISTANCE EVALUATIONS

An anti-corrosive primer (Table 1) with ANCAMIDE® 2832 curing agent was applied to grit-blasted, hot-rolled steel substrate panels. Using conventional spray equipment to provide two to three mils of dry film thickness, the panels were allowed to cure for seven days prior to testing in salt spray. Evaluation of scribe creep was rated accordance with ASTM D 1654. One set of duplicate panels was evaluated for blistering and rusting. After the visual evaluation was completed the scribe areas were scraped to expose the underlying metal substrate, allowing for accurate scribe creep measurements. There was no rust or blisters and minimal scribe creep.

TABLE 1: ANTI-CORROSIVE PRIMER TEST FORMULATION

ANTI-CORROSIVE PRIMER			
COMPONENT A			
	Description	**Weight (lbs.)**	**Volume (gallons)**
1.Liquid Epoxy Resin	Epon 828	239.2	24.79
2.Dispersant	Nuosperse 657	5.51	0.73
3.Thixotrope	Bentone SD-2	8.82	0.73
4.Solvent	Xylene	159.83	22.08
5.Solvent	n-Butanol	22.04	3.38
6.Pigment	Bayferrox 130 M	88.2	2.19
7.Pigment	Heucophos ZCPP	137.79	5.23
8.Filler	Blanc fix micro	198.42	5.48
9.Filler	Wollastocoat 10ES	132.27	5.54
10.Filler	Mica White 325M	110.23	6.68
TOTAL A		**1102.32**	**76.85**
COMPONENT B			
11. Curing agent	Ancamide® 2832	196.39	23.15

TYPICAL PRIMER PROEPERTIES	
Non Volatile (Wt)	81.4 %
Non Volatile (Vol)	70 %
PVC (%)	35.8
VOC (lb./gal)	2.24

Results: Salt fog exposure on coated and scribed steel panels

ANCAMIDE® 2832 curing agent-based primers offer outstanding inter-coat adhesion and long term corrosion resistance.

Formulation	Degree of Rust	Scribe Creep	Field Blistering	Blister Size
Ancamide® 2832	None	10	10	10 (No blisters)

RAPID RECOAT STUDY USING POLYCARBAMIDES

The rapid overcoat properties of ANCAMIDE® 2832 were compared to conventional polyamide HSPA-1 (Table 3). The epoxy primers were evaluated for their ability to be rapidly overcoated with a fast cure isocyanate-based system. Polycarbamide topcoat based on HDI Trimer and a cycloaliphatic diethyl maleate ester curing agent was used. Three mils of an epoxy primer are applied to separate Bondrite B -952 panels and cured for 15 minutes and 60 minutes. The panels were cured for 24 hours and the crosshatch adhesion, as per ASTM 3359, was conducted.

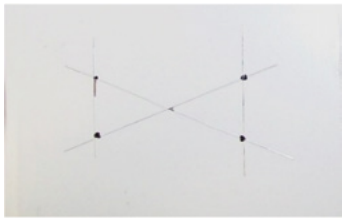
TABLE 3: WET/DRY ADHESION PROPERTIES OF EPOXY PRIMERS WITH POLYCARBAMIDE TOPCOATS

	APPLICATION TIME (TOP COAT)	ADHESION TYPE	ANCAMIDE® 2864	HSPA-1
Epoxy Primer		Dry	5A	5A
		Wet	5A	5A
Epoxy Primer + Polycarbamide top coat	15 min	Dry	5A	2A
		Wet	5A	1A
Epoxy Primer + Polycarbamide top coat	60 min	Dry	5A	2A
		Wet	5A	2A

Results: 15 minutes after topcoat applied

With the ANCAMIDE® 2832, the epoxy primer is dry to touch after 15 minutes at 23ºC. The surface appearance is smooth and wrinkle-free. The intercoat adhesion results were excellent with a rating of 5A achieved. With the HSPA -1 curing agent, the primer was still wet to touch after 15 minutes and the applied topcoat showed base primer bleed through. With this system, the polycarbamide topcoat exhibited very poor intercoat adhesion with a significant area delaminating following the application and removal of the adhesive tape during the crosshatch test.

ANCAMIDE® 2832 EPOXY PRIMER + POLYCARBAMIDE TOPCOAT
Dry to touch after 15 min

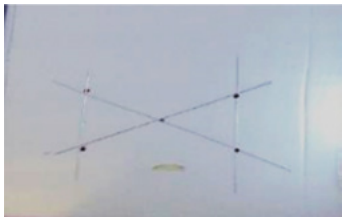


HSPA -1 EPOXY PRIMER + POLYCARBAMIDE TOPCOAT
Wet to touch after 15 min

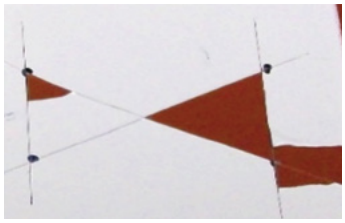
Results: 60 minutes after topcoat applied

When the base primers were subjected to a 60-minute cure at 23ºC followed by application of polycarbamide topcoat, excellent surface appearance and adhesion was observed for the ANCAMIDE® 2832 curing agent. There was some improvement with the HSPA-1 polyamide with no primer bleed through, however, the dry/wet adhesion of the polycarbamide coating was poor with a rating of 2A.

ANCAMIDE® 2832 EPOXY PRIMER + POLYCARBAMIDE TOPCOAT
Crosshatch adhesion



HSPA -1 EPOXY PRIMER + POLYCARBAMIDE TOPCOAT
Crosshatch adhesion

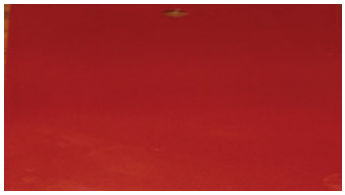


Results: Wet-on-wet spray application 15 minute dry time

ANCAMIDE® 2832 epoxy primer was spray applied at 2-3 mils DFT on Bondrite B-952 panels. Dry cotton balls were dropped at regular interval and the panels were turned over to determine the time at which cotton ball no longer stuck to the primer surface without leaving any cotton fiber residue. The cotton balls dropped off the panels after 15 minutes.

The primed panels were top coated with polycarbmide topcoats after 15 minutes and 24 hours of cure. The panels were dry to touch in 25 minutes after the topcoat application. Crosshatch adhesion tests were conducted on the cured panels after 24 hours.

ANCAMIDE® 2832 EPOXY PRIMER
Dry to touch after 15 minutes



ANCAMIDE® 2832 EPOXY PRIMER + TOPCOAT
Dry to touch after 25 minutes

Crosshatch adhesion after 24 hrs curing

ANCAMIDE® 2864 Curing Agent

Technical Details

ANCAMIDE® 2864 curing agent is a low viscosity, modified edpolyamide solution supplied in benzyl alcohol. It provides through-cure at both ambient and low temperature with outstanding mechanical property development. The performance benefits of ANCAMIDE® 2864 curing agent (Table 1) include a lower initial curing agent viscosity allowing for high-solids coatings. It also offers an excellent surface appearance and film integrity, as shown in Figure 1, as well as outstanding MEK double rub resistance, early through-cure.

TABLE 1: HANDLING AND PERFORMANCE PROPERTIES

ANCAMIDE® 2864			
Handling	Viscosity (mPa·s)		2,300
	Loading (PHR)		65
	Gel Time (Mins)		35
Film Properties @ 25°C	Film Appearance		Clear/Gloss
	Water Spot Resistance[(a)]	1d 7d	2 4
	Impact cm.kg	Direct Reverse	60 40
Film Properties @ 5°C	Film Appearance		Clear/Gloss
	Water Spot Resistance	1d 7d	1 4
	MEK Double Rubs	1 d 3 d	>200 Haze > 200 Gloss

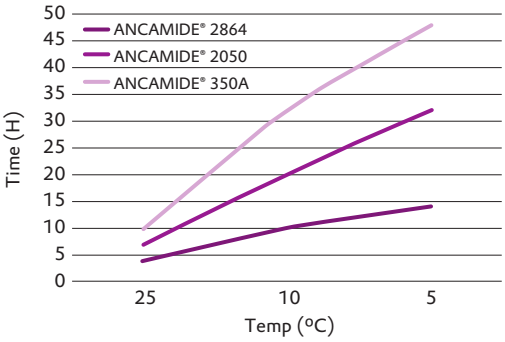
(a) Evonik internal test with water placed on film rating 5 to 0 5= excellent, no water stain 0 = poor, severe water stain

FIGURE 1: ANCAMIDE® 2864 SURFACE APPEARANCE AT AMBIENT AND LOW TEMPERATURE

IMPROVED LOW TEMPERATURE CURE RATE

When mixed with liquid epoxy resin, the thin film set times of ANCAMIDE® 2864 provide significant improvements over both conventional and high-solids polyamides which are also promoted for low-temperature cure applications. Figure 2 demonstrates the performance benefits of ANCAMIDE® 2864 curing agent at low temperatures, phase 3 dry time of 14 hours compared to 48 hours for ANCAMIDE® 350A curing agent and 30 hours for ANCAMIDE® 2050 curing agent.

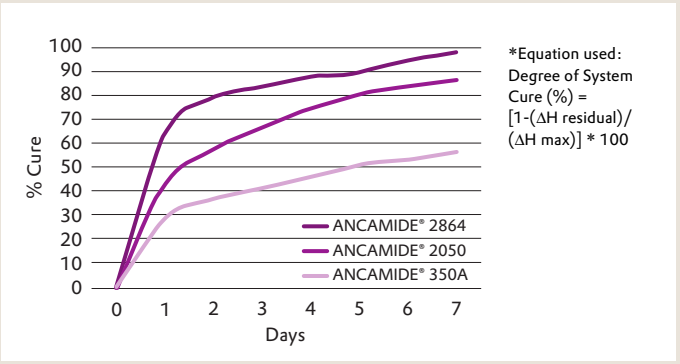
FIGURE 2: FLOW TEMPERATURE CURE



RAPID CURE RATE

This DSC analysis was conducted via measurement of the residual exotherm, during the curing process. Samples were prepared at ambient temperature and then the sealed DSC cells were immediately stored at 5°C, for a period of 1- 7 days. After 24 hours, ANCAMIDE® 2864 shows excellent early cure development at 5°C achieving 64% which is 2 times faster than ANCAMIDE® 350A (30% conversion). After 7 days the extent of cure for ANCAMIDE® 2864 was >95%, compared to ANCAMIDE® 350A (55%) and ANCAMIDE® 2050 (83%).

FIGURE 3: RAPID CURE RATE AT 5°C



CORROSION RESISTANCE EVALUATIONS

An anti-corrosive primer formulation based on ANCAMIDE® 2864 (Table 2) was applied to grit blasted hot rolled steel substrate panels. Using conventional spray equipment in double coats to provide 6 mils of DFT. Panels were left to cure for 7 days prior to testing in salt spray. Panels were scribed and evaluated for field blisters using ASTM B 117. Evaluation of scribe creep was rated in accordance with ASTM D 1654. One set of duplicate panels were evaluated for blistering and rusting. After the visual evaluation was completed, the scribe areas were scrapped to expose the underlying metal substrate, allowing for accurate scribe creep measurements.

TABLE 2: ANTI-CORROSIVE PRIMER TEST FORMULATION

ANTI-CORROSIVE PRIMER FORMULATION				
COMPONENT A				
	Description	**Source**	**Weight (lbs.)**	**Volume (gallons)**
Epon 828	Epoxy resin	Hexion	26.96	23.15
Epodil® 742	Epoxy diluent	Evonik	3.10	2.87
Antiterra U	Dispersant	BYK	0.56	0.59
Bentone SD-2	Thixotrope	Elementis	0.77	0.48
Xylene	Solvent		11.60	13.54
n-butanol	Solvent		4.04	5.04
Bayferrox 130M	Filler	Lanxess	4.72	0.94
Heucophos ZCP Plus	Anti-corrosive pigment	Heubach Intl	5.94	1.69
Blanc Fixe Micro	Filler	Sachtleben Chemie	20.61	4.68
Wollastocoat 10 ES	Filler	Nyco Minerals	8.59	2.96
Plastorit 000	Filler	Imerys Talc	13.11	4.69
TOTAL A			**100.0**	**60.63**
COMPONENT B				
Ancamide® 2864	Curing agent	Evonik	19.90	18.96
Xylene	Solvent		0.82	0.95
n-butanol	Solvent		0.24	0.30
TOTAL B			**20.96**	**20.21**
TOTAL A+B			**120.96**	**80.84**

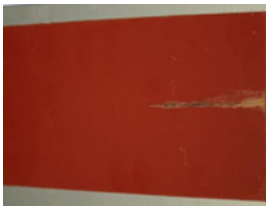
TYPICAL PRIIMER PROPERTIES	
Mix Ratio Part A: Part B (vol)	3:1
PVC (%)	25.5
Vol Solids (%)	85.9
VOC (g/l)	198
Mix viscosity (mPa·s)	± 550

Results: 1000h Salt Spray Exposure of Coated and Scribed Steel Panels

ANCAMIDE® 2864 curing agent-based primer exhibits outstanding corrosion resistance.

Formulation	Degree of Rust	Scribe Creep	Field Blistering	Blister Size
ANCAMIDE® 2864	None	10	10	10 (No blisters)

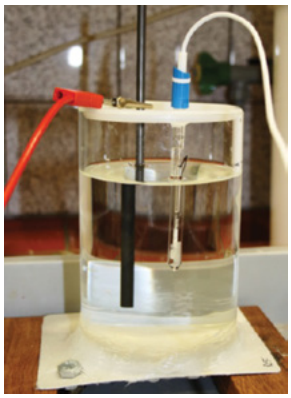
FIGURE 4: ANCAMIDE® 2864 PRIMER
After 2000 h of salt spray performance



CATHODIC DISBONDMENT RESISTANCE

To demonstrate disbondment resistance, each test panel is fitted with one intentional of 3 mm diameter in the paint layer, and then covered with a glass cylinder (inside diameter = 99 mm; high 155 mm) on the painted side. The glass cylinders are placed so that from every panel the intentional holiday is situated in the middle of the test area. The glass cylinder is filled with about 1000 mL of electrolyte (artificial seawater). To establish the electrical circuit, a connection to the steel panel is made with a platinum or graphite electrode that is placed in the center of the tank. This acts as the anode and is connected to the positive lead from the power supply After 28 days at room temperature (23°C), the test was stopped.

SEA WATER
1.5v potential @ 23°C

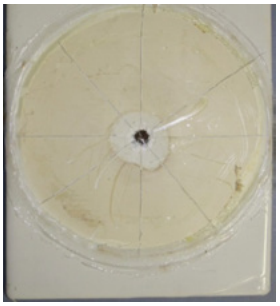


Results: Degree of disbondment after salt water exposure

The exposed coatings were checked for loss of adhesion, blistering (ASTM D714) and other defects (discoloration, cracking, etc.). Loss of adhesion was determined by cutting eight radial pies, extending 3 cm from the center of the holiday. Starting at the intentional holiday and working outward, the degree of disbondment was measured. After 28 days of exposure, coatings formulated with ANCAMIDE® 2864 curing agent and the benchmark ANCAMIDE® 2050 resulted in an average radial creep of 1 mm and 3 mm, respectively. This is well within the requirements of the test and as such both coating systems meet the ASTM G8-96 standards for pipe coatings requiring excellent cathodic disbondment resistance.

ANCAMIDE® 2864
Creep: 1mm after 28 days

ANCAMIDE® 2050
Creep: 3mm after 28 days

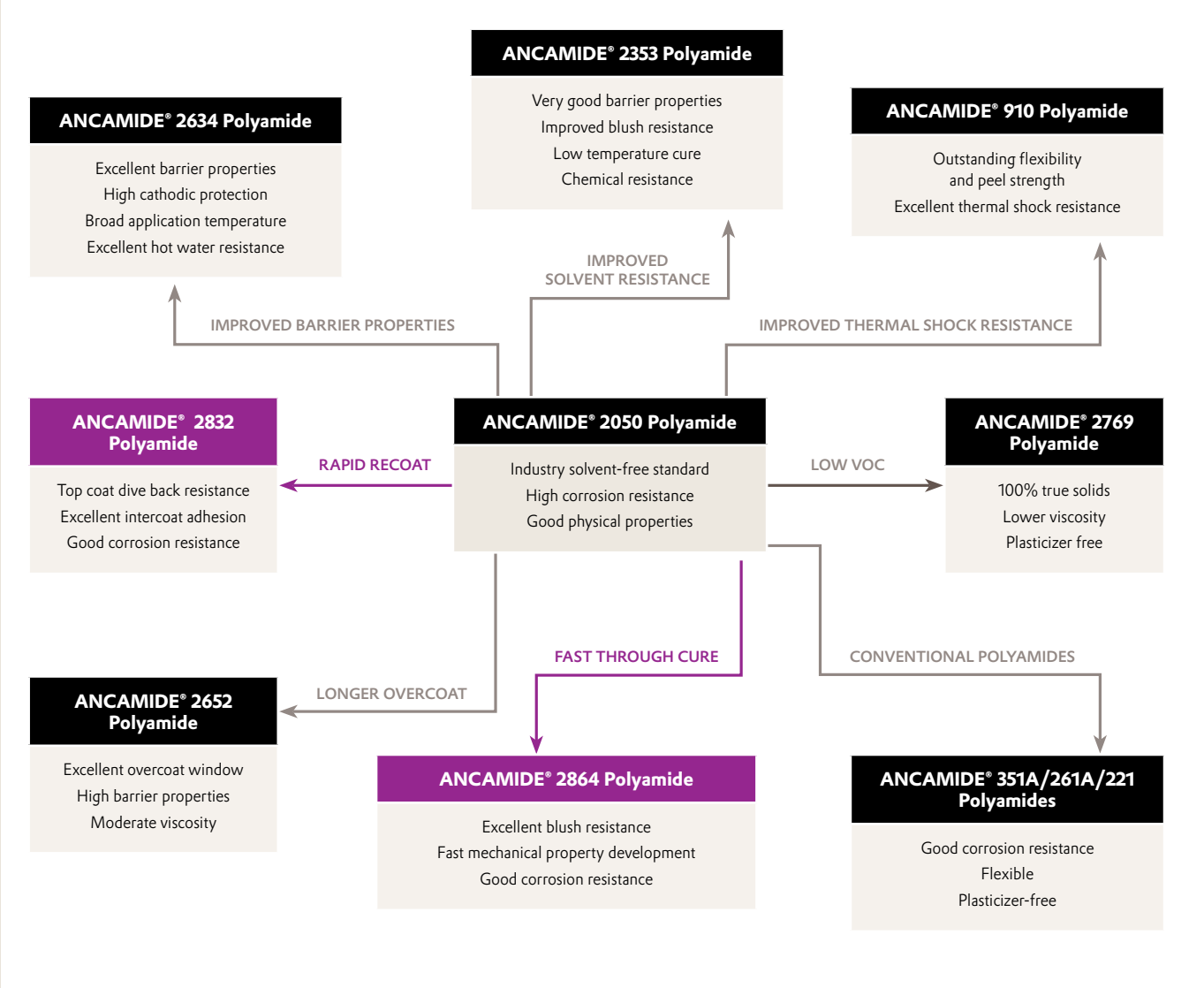


ANCAMIDE® POLYAMIDE CURING AGENTS

Selection Guide

Evonik offers a complete line of polyamide curing agents, known for its high quality, water and corrosion resistance, and superior performance. ANCAMIDE® 2832 and 2864 are built for applications that require rapid cure rates and recoat capabilities and long term protection of assets. In addition, there are other polyamides in our portfolio that can provide the right set of performance characteristics to enhance specific applicator productivity and asset protection, as shown in the product selection diagram below.

For more information on our complete line visit crosslinkers.evonik.com



EVONIK CORPORATION
7201 Hamilton Blvd.
Allentown, PA 18195
1 800 345-3148
Outside U.S. and Canada 1 610 481-6799

For Technical Information and Support:
Americas: picus@evonik.com
Europe, Middle East, Asia: apcse@evonik.com

For Samples:
Americas: prodinfo@evonik.com
Asia: picasia@evonik.com
Europe, Middle East, Asia: apcse@evonik.com

For Customer Service:
US/Canada: cspolyur@evonik.com
Latin America/South America: lachem@evonik.com
Japan: pmdcsojp@evonik.com
Asia: pmdcso@evonik.com
APCS PMGP (Korea): apcskr@evonik.com
Europe, Middle East, Asia: apcsepx@evonik.com

This information and any recommendations, technical or otherwise, are presented in good faith and believed to be correct as of the date prepared. Recipients of this information and recommendations must make their own determination as to its suitability for their purposes. In no event shall Evonik assume liability for damages or losses of any kind or nature that result from the use of or reliance upon this information and recommendations. EVONIK EXPRESSLY DISCLAIMS ANY REPRESENTATIONS AND WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED, AS TO THE ACCURACY, COMPLETENESS, NON-INFRINGEMENT, MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE (EVEN IF EVONIK IS AWARE OF SUCH PURPOSE) WITH RESPECT TO ANY INFORMATION AND RECOMMENDATIONS PROVIDED. Reference to any trade names used by other companies is neither a recommendation nor an endorsement of the corresponding product, and does not imply that similar products could not be used. Evonik reserves the right to make any changes to the information and/or recommendations at any time, without prior or subsequent notice.

EVONIK
Leading Beyond Chemistry