Breakthrough epoxy coating technology gets you back in service in under an hour

Product at glance:
Ancamide® 2832
Ancamide® 2864

Presentation October 23rd – Prospector

Presenter: Sudhir Ananthachar

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Agenda

- Market Trends & Drivers
- Product for faster return to service in factory and field applied epoxy curing systems
- Product Positioning

Market Trends Drive New Product Innovations

Better products: Enhanced performance

Improved corrosion resistance

Enhanced mechanical property

Improved adhesion to poorly prepared steel

Improved chemical resistance

Improved productivity: fast turn-around time

Fast through cure at applied temperature

Wider application window

Reduced downtime

Simplified handling/application

Eco-friendly: environmentally and user friendly

Low or zero VOC

Improved EH&S profile – elimination of harmful raw materials "green" or sustainable products

Curing Agents Introduction

- Expand the market space of Specialty Polyamides in coatings applications where existing technologies does not deliver the desired level of performance
- Leverage novel amine technology in formulated polyamides to deliver high performance properties
- Novel class of polyamides targeting to gain share, where speed of cure and rapid return to service under a range of application conditions is required
- Recent developments have focused on polyamides which are designed to allow our customer´s customer to improve productivity by providing characteristics such as:
  - Faster drying times and improved blush resistance at ambient and low temperatures (5°C)
  - Faster throughput in marine & protective applications
  - Fit for purpose corrosion resistance

Ancamide® 2832 Features and Benefits

- Rapid through cure/ Faster hardness build at ambient temperature (15-30 minutes)
- Receive the top coat without wrinkling (top coat dive back resistance) or surface defects and outstanding surface appearance
- Tack and blush free regardless of application conditions
- Good corrosion resistance

Ancamide® 2832 physical and handling properties compared to high solids polyamides

Property	Units	Ancamide 2832	Competitive curing agent (HSPA-1)
Color	Gardener	<8	<8
Viscosity	mPa.s (cP)	500-2000	2000
Amine Value	mgKOH/g	325-450	132
Specific gravity		1.02	1.03
AHEW	WT/{H}	156	250
PHR with LER EEW 190	PHR	82	90-130
Gel Time	min	22	140
TFST (25ºC) Phase 3	h	2:45	7:30
Persoz Hardness (25ºC) Day 7	s	290	203
Shore D Hardness (25ºC) Day 7		74	64

Ancamide® 2832 features faster dry to touch enabling rapid overcoatability with excellent adhesion

System	Application Time (topcoat)	Adhesion Type	Ancamide 2832	Competitive HSPA-1
Epoxy Primer Touch dry (minutes)			15	205
Coating System Cross Hatch Adhesion				
Epoxy Primer		Dry	5A	5A
		Wet	5A	5A
Epoxy Primer + Polycarbamide Topcoat	15 mins	Dry	5A	2A
		Wet	5A	1A
Epoxy Primer + Polycarbamide Topcoat	60 mins	Dry	5A	2A
		Wet	5A	2A

Ancamide® 2832 delivers rapid cure compared to competitive polyamide curing agent

Epoxy primer based on Ancamide 2832

15 min: cotton ball falls off

15 mins tack free

Vs.

Epoxy primer based on competitive polyamide (HSPA-1) at 15 min: cotton ball still stuck to primer

200 mins tack free

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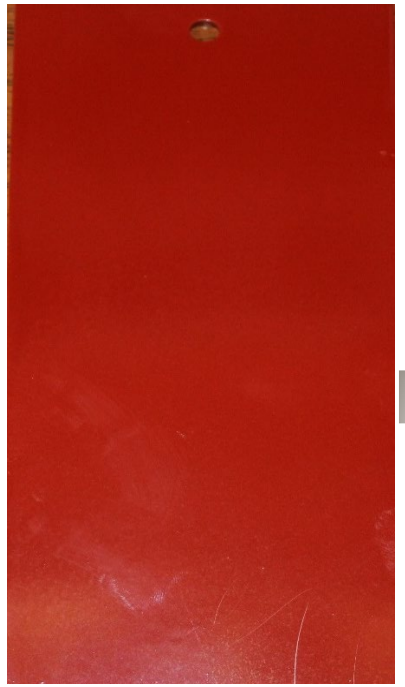
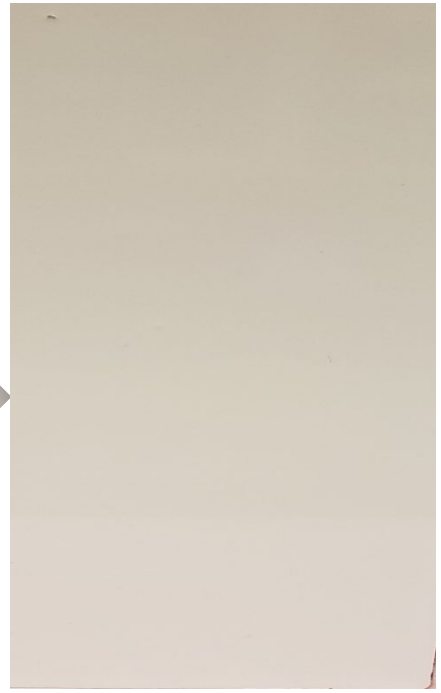
Total coating system Ancamide® 2832 primer with polycarbamide top coat

Epoxy primer



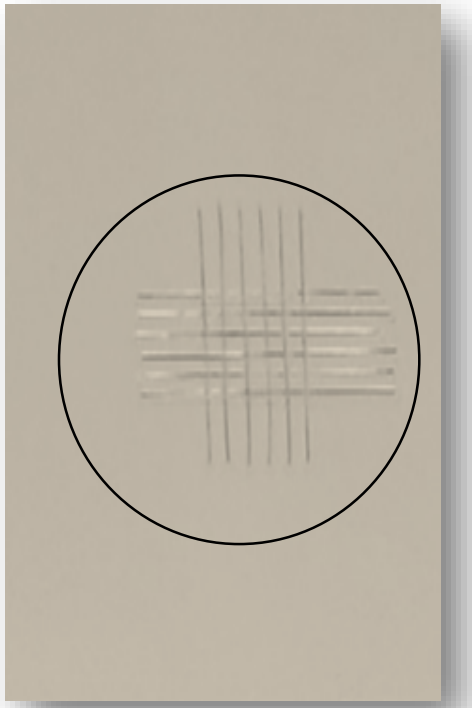
Dry to touch after 15 min

Primer with polycarbamide top coat



Dry to touch after 15 min

Cross hatch adhesion test 24 hours



- The primer was spray applied using a conventional spray gun at 3 mil WFT
- After 15 min, the top coat was spray applied using conventional spray gun 4 mil WFT

The entire application was complete in 40 min

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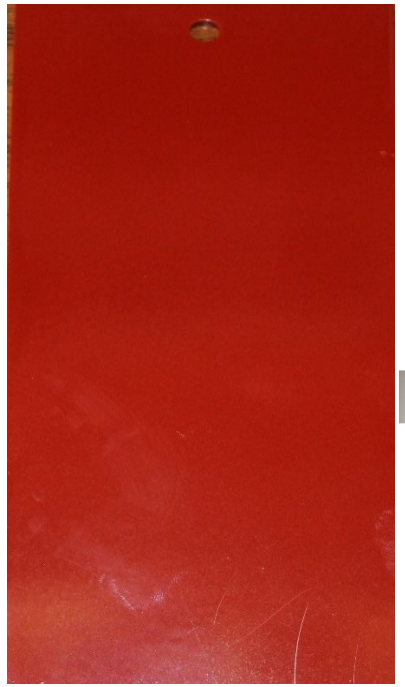
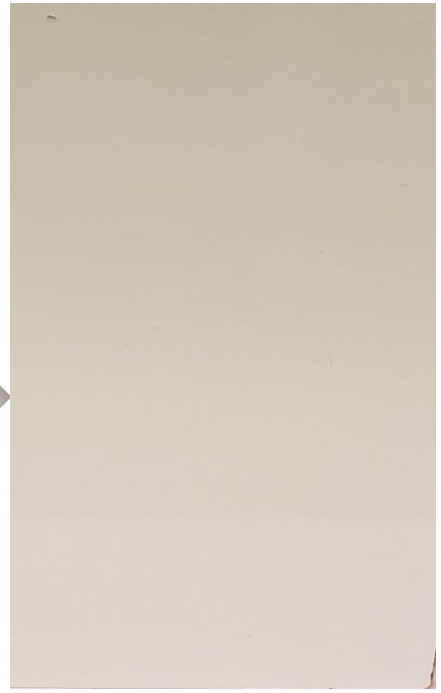
Total coating system Ancamide® 2832 primer with polycarbamide top coat

Epoxy primer



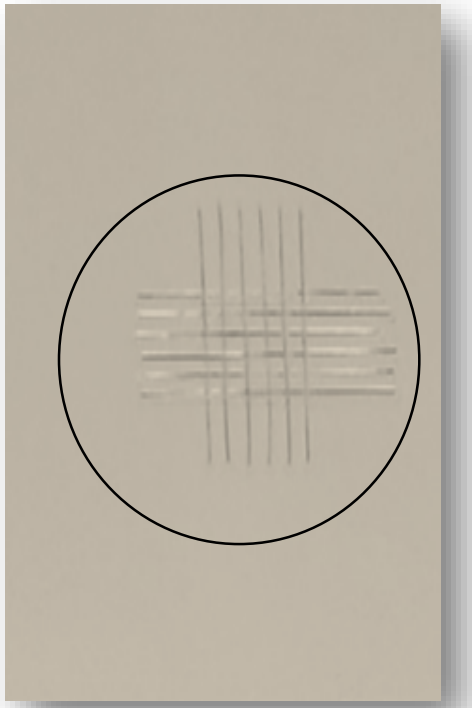
24 hours dry time

Primer with polycarbamide top coat



Dry to touch after 15 min

Cross hatch adhesion test 24 hours



- The primer was spray applied using a conventional spray gun at 3 mil WFT and allowed to dry for 24 hrs
- After 24 hours the top coat was spray applied using conventional spray gun 4 mil WFT

Demonstrates the overcoatability

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Ancamide® 2832 providing very good corrosion protection

- Standard epoxy - high solids primer containing anti-corrosive pigment (zinc phosphate) at 1000h

SALT SPRAY RESISTANCE 1000 h anticorrosive primers

2 mil DFT

Formulation	Scribe Creep	Field Blistering	Blister Size
Ancamide 2832	10	10	10 (no blisters)
Competitive polyamide primer (HSPA-1)	10	10	10 (no blisters)

5% NaCl (salt spray), cabinet temperature 35°C
Rating 10= Best (no blisters), 0= worst

Ancamide® 2864 Features and Benefits

- Provide enhanced compatibility – good surface appearance and excellent blush resistance over a wide range of application conditions
- Fast through cure providing rapid property development
- Low temperature cure (5°C)
- Good corrosion protection

Both panels applied and cured at 5°C and 60% relative humidity

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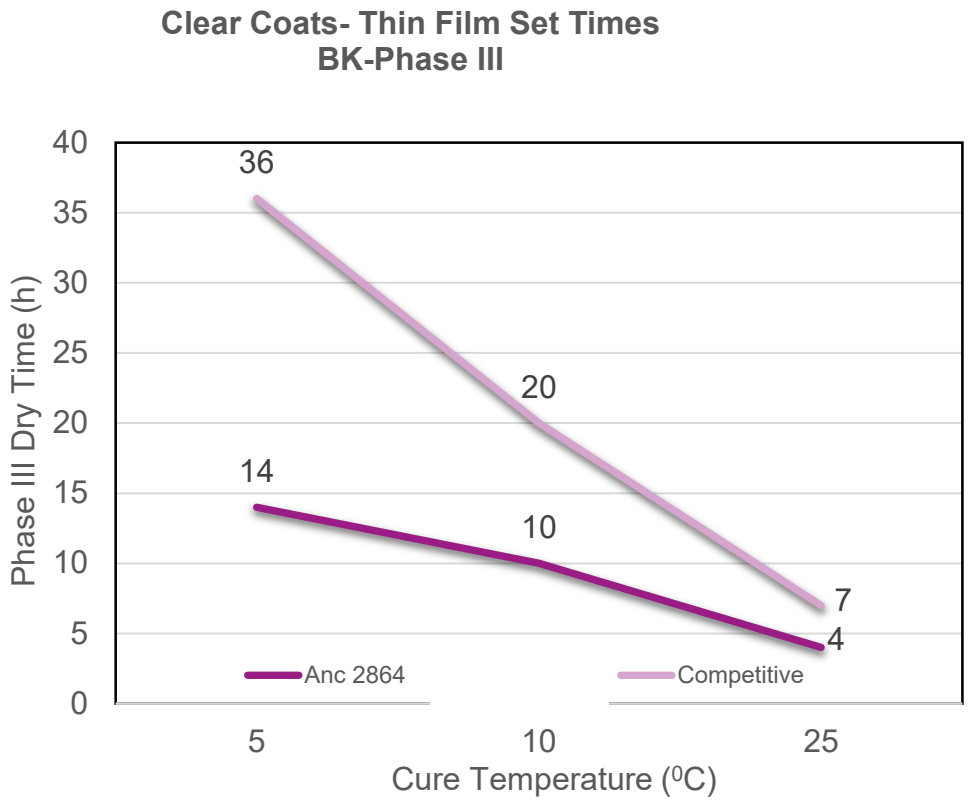
Ancamide® 2864 physical and handling properties

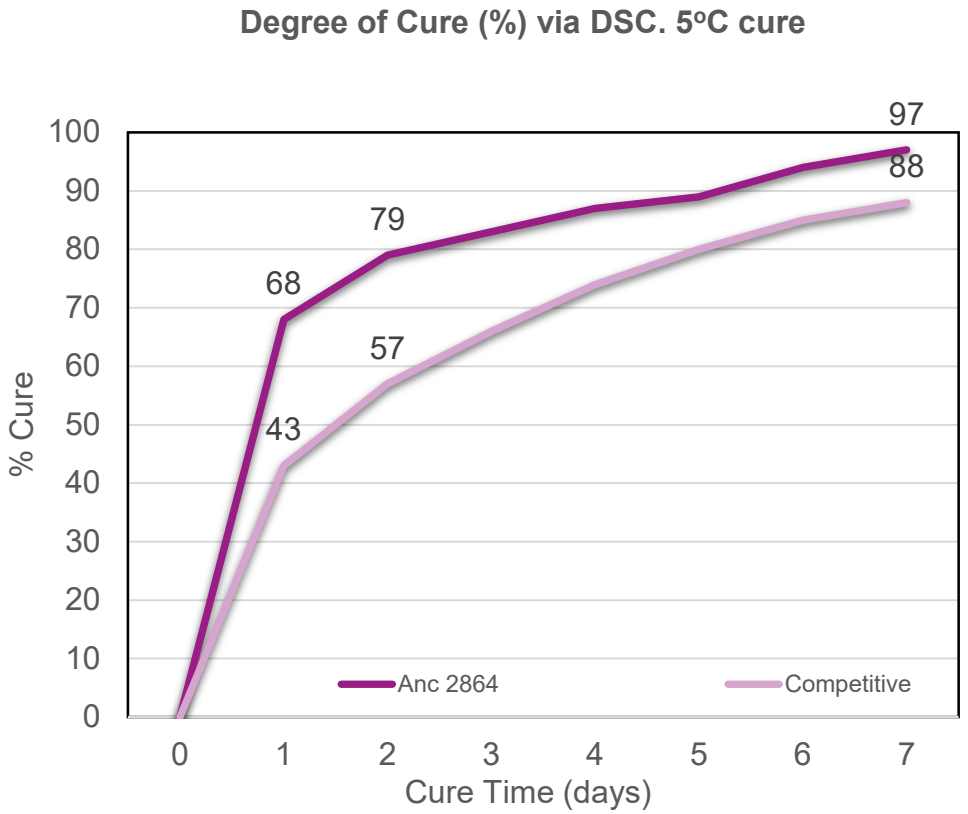
Property	Unit	Value
Color	Gardener	<8
Viscosity	mPa.s (cPs)	1,200-2,200
Solids	%	100
Amine Value	mgKOH/g	315-350
Specific Gravity		1.04
AHEW		135
Loading (Liquid Bis A resin EEW190)	PHR	60-65

Ancamide 2864 Curing Agent - Handling and Performance Properties

	Properties	Units	Ancamide 2864	Competitive curing agent
Handling	Viscosity mPa.s		1,850	4.500
	Loading (PHR)		65	70
	Gel Time (Mins)		35	65
Film Properties @ 25°C	Film Appearance		Clear/gloss	Clear/gloss
	Water Spot Resistance	1d 7d	2 4	2 4
	Impact cm.kg	Direct Reverse	60 40	100 45
Film Properties @ 5°C				
	Film appearance		Clear/Gloss	Clear/Gloss
	Water Spot Resistanc	1d 7d	1 4	1 4
	MEK Double rubs	1d 3d	>200 haze >200 gloss	1 destroyed 60 loss of film

Ancamide 2864 – Allows for Improved Cure Profiles over a Range of Application Temperatures.





Ancamide 2864

Fast build up of dry time over applied temperatures

Significant improvement with liquid resin at low temperature

Ancamide 2864

Rapid degree of epoxy-amine conversion at lower temperatures

Continues high conversion vs slow development of conventional polyamide

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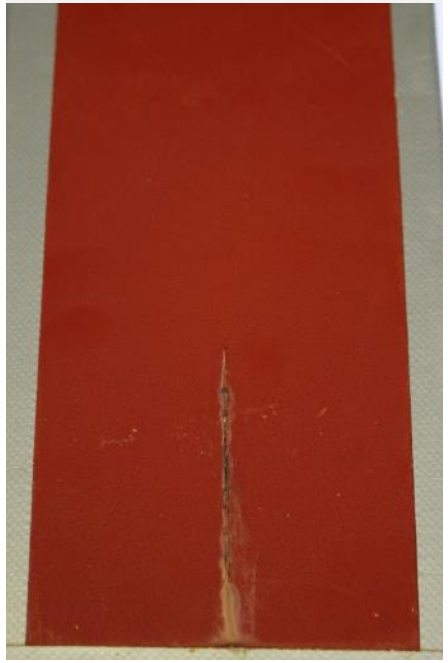
Ancamide® 2864 Polyamide Technology – Primers Provides High Levels of Corrosion Protection

- Standard Epoxy - high solids primer-containing anti-corrosive pigment (Zinc Phosphate)

Ancamide 2864
2000 h Salt Spray
Field 10 Scribe 10



Competitive
2000 h Salt Spray
Field 10 Scribe 10

Anti-corrosion primer formulation based on Bis A DGE (EEW 190)
25% PVC, VOC <200g/l, 2 coats (total DFT 190-220µm)

ASTM B-117, ASTM Rating D-1654

SALT SPRAY RESISTANCE –Anti-Corrosion Primers

Formulation	Scribe Creep	Field Blistering	Blister Size
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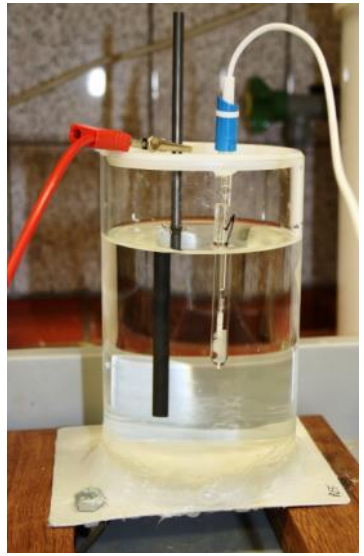
Ancamide® 2864 : Technology Provides Good Levels of Cathodic Protection

- The **cathodic disbondment** test method determines the resistance to cathodic disbondment of a coating system between coating and steel substrate, resulting in loss of coating adhesion.



Experimental Cell
Sea water
1.5v potential
28 days @ 23°C

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Loss of adhesion 1mm
No field blisters

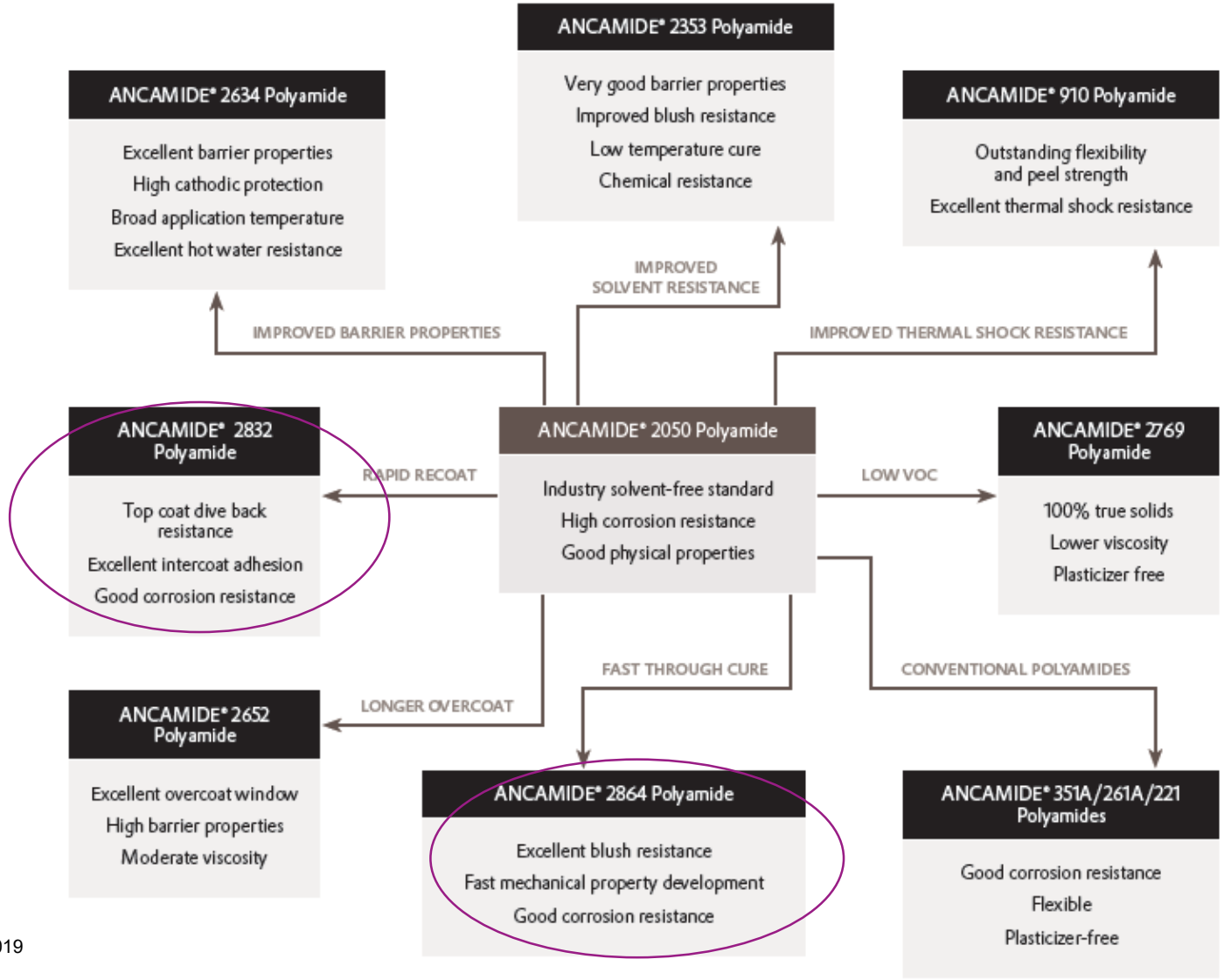
Competitive

Loss of adhesion 2-3mm
No field blisters

- Cathodic disbondment comparable vs existing high solid polyamides
- Technology meets ASTM G8 standards for pipeline and marine coating applications

Multiple coats total DFT 600 +/- 100

Polyamide Positioning



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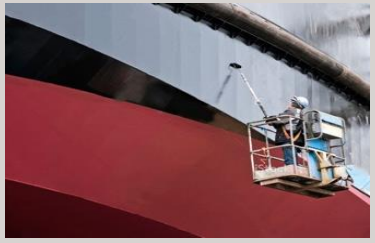
Application recommendations.

Ancamide® 2832 For Factory-Applied systems

- Faster cure property development at ambient temperature
- Early recoat window – rapid multi layer build up. self on self and with PU/polycarbamide technologies



Ancamide® 2864 For Field-Applied systems

- Ancamide 2864 meets an industry driver for enhanced productivity and faster return to service for field applied systems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