

Unrivalled Cure Speed and Excellent Aesthetics Brings a New Dimension to Fast Return to Service in Concrete Flooring

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Presentation Outline

- Background and market drivers
- Solution for one-day-flooring: Anquamine 728
- Primer performance
- Topcoat properties
- One-day flooring performance
- Summary

Waterborne Epoxy is an Established Technology

■ Competitive advantages

- Low to zero VOC
- Easy water clean up
- High aesthetics
- Quick dry times
- Excellent adhesion
- High impact resistance
- Best cost in use



Factory Floors

Easy to apply
Repairable
Excellent
mechanical
properties



Electronics

High aesthetics
No out-gassing
and clean room
conditions
ESD-variants



Parking Decks

Superior
overcoatability
High durability
Low odor

Market Trends Drive Epoxy Systems for Increased Productivity



Enhanced Product Performance

Good aesthetics, better UV stability



Productivity Improvement

Fast Return to Service

Fast cure speed, low temperature cure, robust application



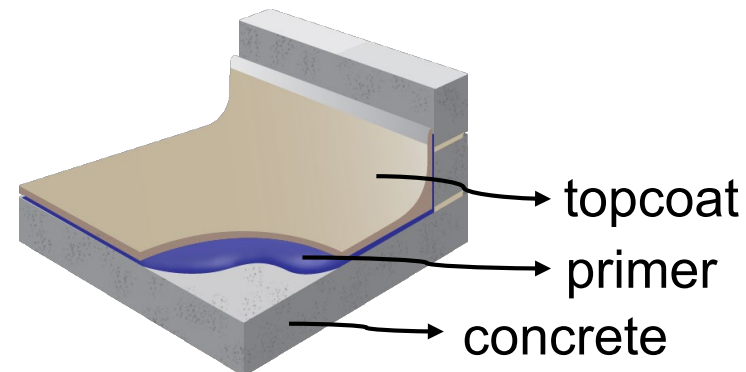
Environmentally and User Friendly

Low VOC, low emission, solvent free, waterborne

One-Day Flooring

Concept

- Primer is critical – fast dry and fast cure
- Topcoated by the same shift and same crew
- Fast return to service in one day



Benefits

- Applicators: apply two coats in one day
- End-user: minimum downtime

One-Day-Flooring Requirements: Fast Cure *and* Good Aesthetics

Requirements for primer and topcoat

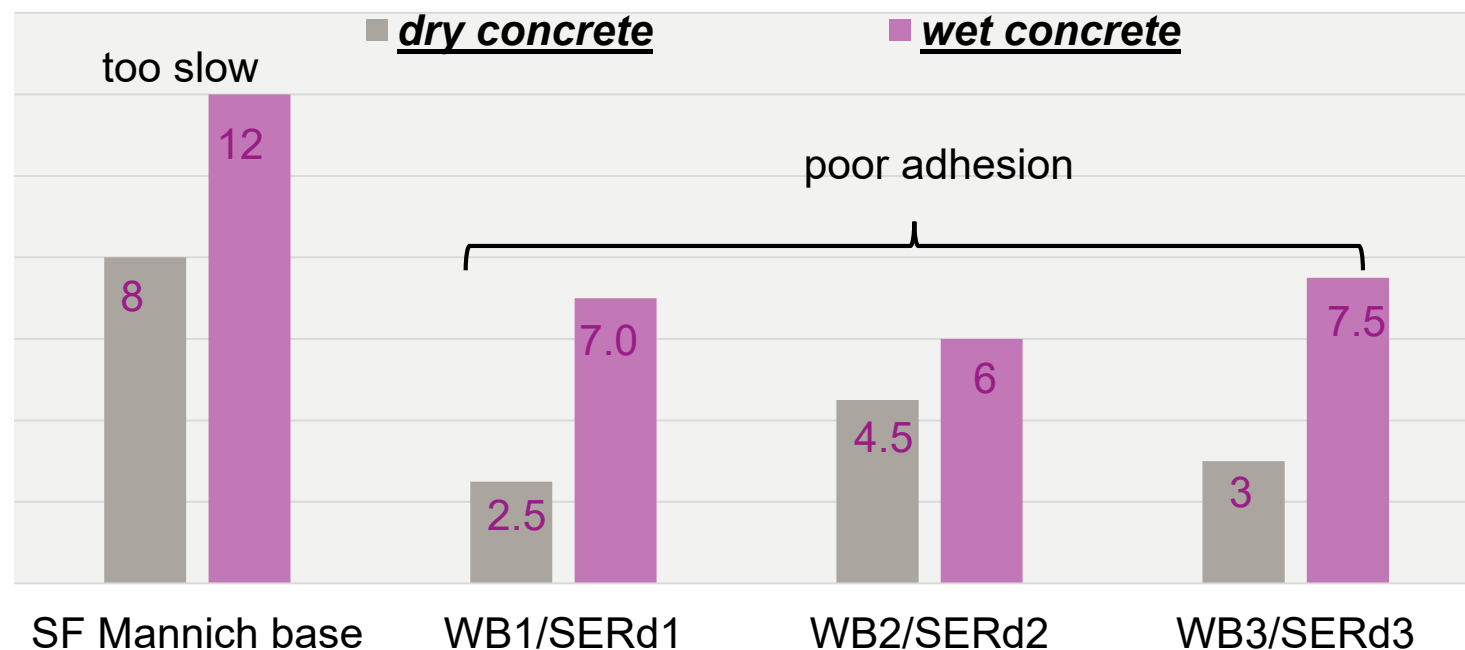
1. Primer: Fast Cure @10°C

- Dry hard time
 - 3-4 h
- Adhesion to concrete
 - >450 psi (3 MPa)
- Good carbamation resistance
 - Good intercoat adhesion

2. Topcoat: Good Aesthetics

- UV durability
- Carbamation resistance
- Minimal pigment flocculation

Commercially available primer dry hard time (h)



- 10C/60% RH, Coated at 400 g/m² (15.6 mils) wet film thickness (WFT) on dry and wet concrete
- Dry hard test: ASTM D1640
- Adhesion test: ASTM 4541

Solution for One-Day Flooring: Anquamine 728

- New waterborne epoxy curing agent
- Use in concrete **primers and topcoats**
- Key features: **fast cure** and **good aesthetics** under **adverse cure conditions** (10 °C & 60-85% RH)
- Key benefits: **next day back-in-service, minimum down time**

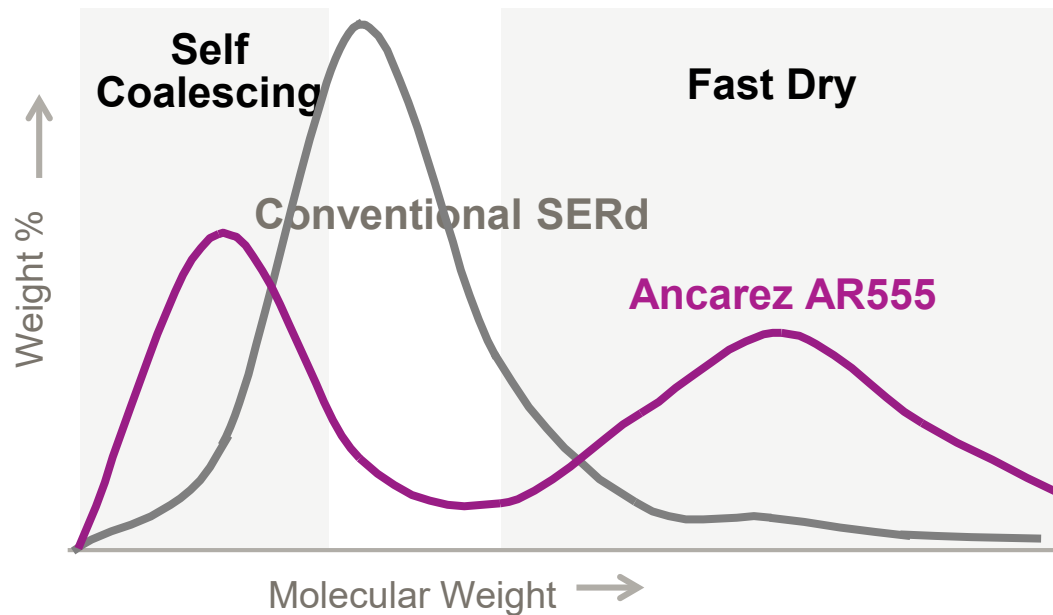
	Anquamine 728	Ancarez AR555
Appearance	Clear yellow liquid	Dispersion
Colour (Gardner)	max 5	
Viscosity (cPs)	5,000-15,000	200
Solids, calculated (wt%)	53-55	55
Equivalent Weight	AHEW 250	EEW 550, supplied
Use level AR-555	PHR 34	

Starting Point Formulations of Anquamine 728 Floor System

- Primer based on SER dispersion Ancarez AR555; Topcoat using diluted LER

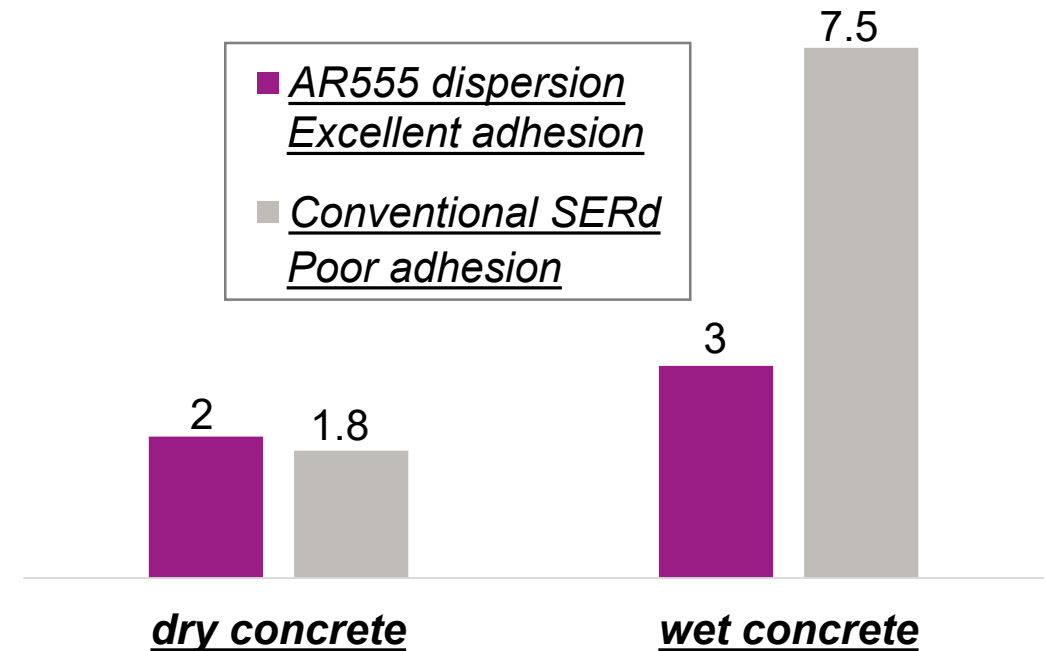
Part A		Concrete Primer (pbw)	White Topcoat (pbw)
Anquamine 728 curing agent		20	29.1
Surfynol DF-62 defoaming agent	Evonik		0.1
Zetasperse 3800 dispersing agent	Evonik		1.1
Ti-Pure R960 titanium dioxide	Chemours		25.6
Tafigel PUR-55 rheology modifier	Muenzing		0.6
Dynol 980 leveling agent	Evonik		0.5
Water			20.1
Part B			
Ancarez AR555 epoxy resin dispersion	Evonik	60	
90/10 Epon828/Epodil 748 diluted LER (use level 125-130 phr)			22.9
Part C			
Water		20	To application viscosity
Total Parts		100	100
Solids content (wt%)		44%	~55%

Ancarez AR555: Unique Bimodal Molecular Weight Distribution



- Bimodal distribution eliminate the need for coalescing solvent, zero VOC
- Delivers combination of
 - **Fast dry** of a solid epoxy resin, and
 - **Excellent adhesion** performance of a liquid epoxy resin

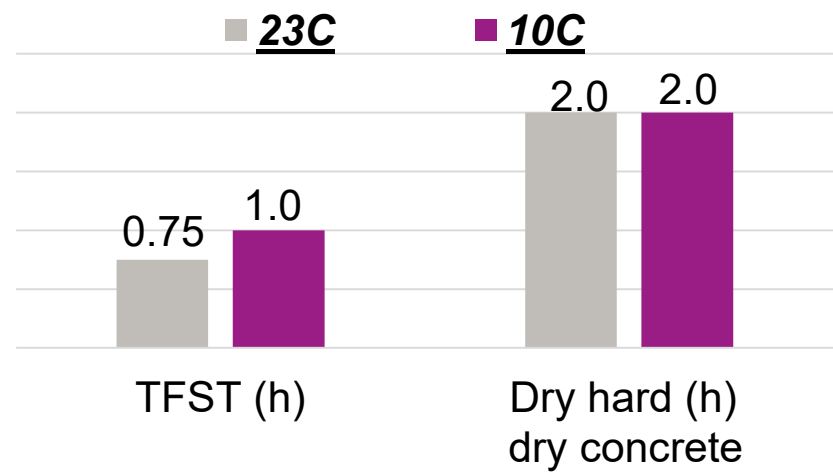
Anquamine 728 primer dry hard time (h)



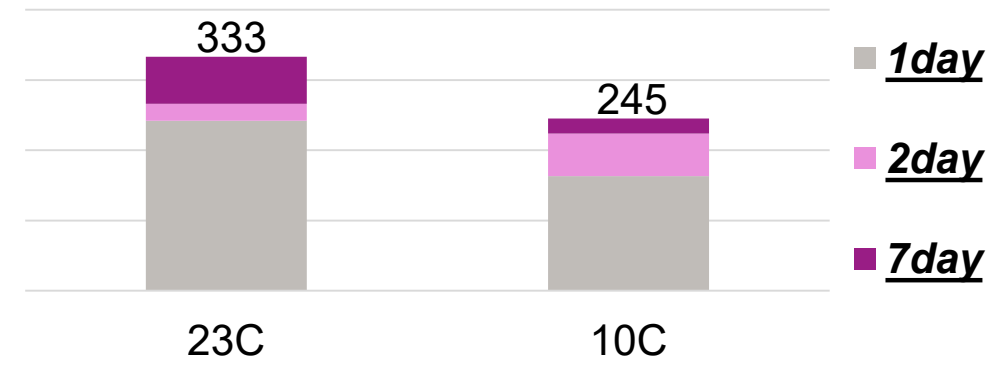
- Evaluated 10 °C/60% RH, on dry and wet concrete at wet film thickness (WFT) of 15.6 mil (400 g/m²)
- Adhesion test: ASTM D4541; excellent adhesion: substrate failure, >900 psi (6.2 MPa) bond strength; poor adhesion: coating failure

Anquamine 728: Fast Cure Primer Properties with AR555

Fast dry time

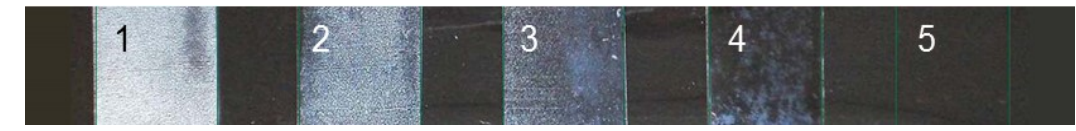


Persoz hardness build



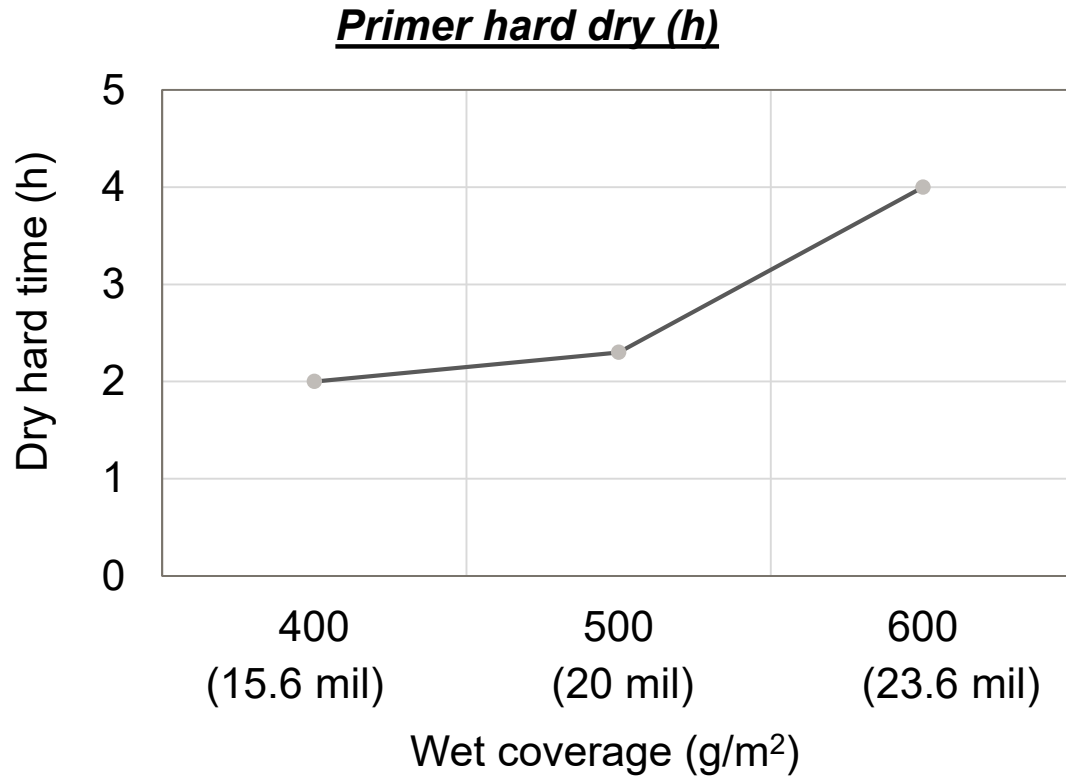
Other properties

Carbamation resistance	5
Gloss (60°)	>150
Adhesion to wet concrete	>870 psi (6 MPa)
High thickness (WFT)	up to 600 g/m ² (23.6 mil)
Overcoatability	Epoxy, WB PU

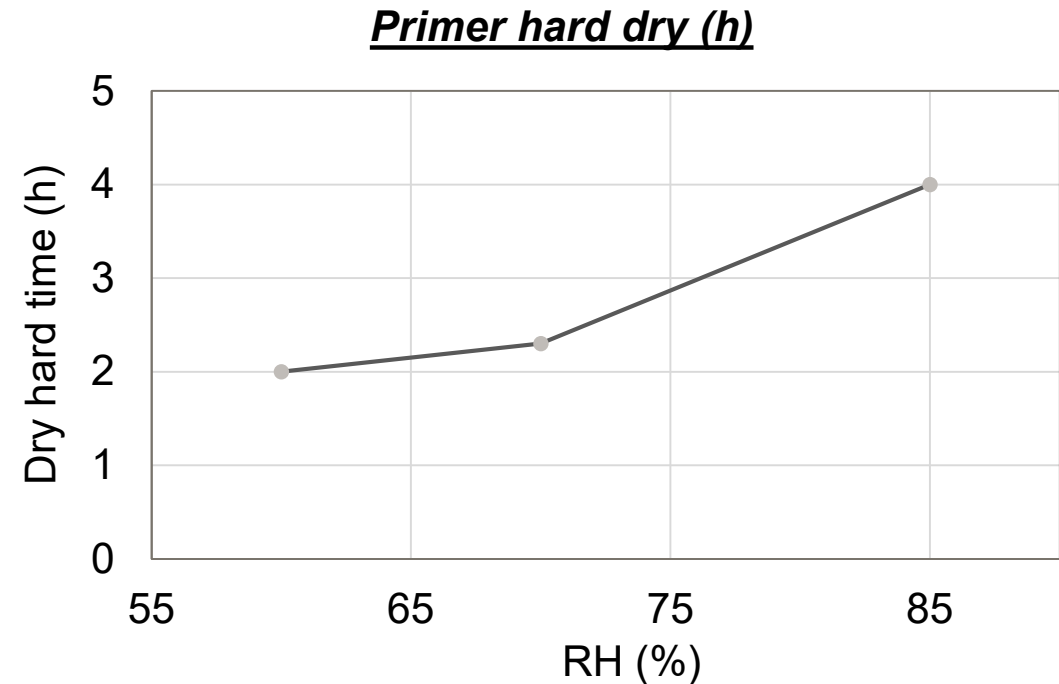


Carbamation resistance following wet patch method (ISO 2812), Scale 1-5 (5=best)

Anquamine 728: Fast Dry Primer at High Build/High Humidity at 10 °C



- Coated on dry concrete at 10C/60% RH
- Dry hard test: ASTM D1640
- Adhesion test: ASTM 4541, bond strength >750 psi (5.2 MPa)



- Coated at WFT 400 g/m² (15.6 mils) on dry concrete at 10C/60% RH
- Dry hard test: ASTM D1640
- Adhesion test: ASTM 4541, bond strength >750 psi (5.2 MPa)

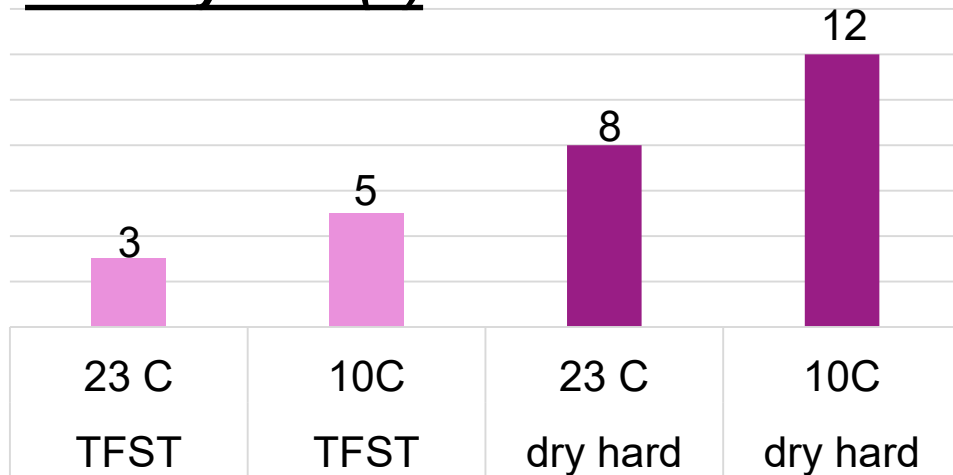
Anquamine 728 Topcoat with Diluted Liquid Epoxy Resin

— Fast Cure and Excellent Adhesion to Primer

Topcoat requirements:

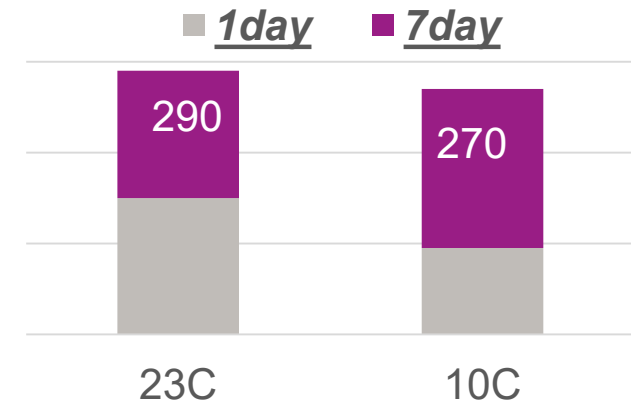
- Fast cure at 10 °C
 - Dry hard time < 16h
- Excellent intercoat adhesion to primer
 - > 435 psi (3 MPa)
- Good aesthetics

Fast dry time (h)



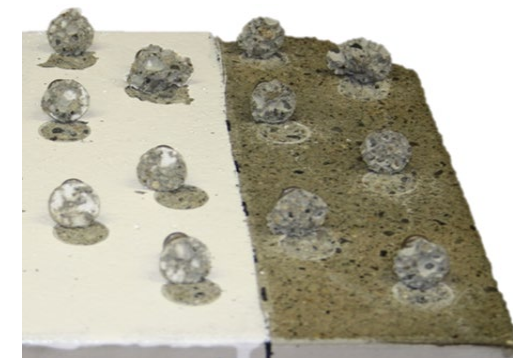
— TFST: ASTM D5895, dry hard: wet concrete, 400 g/m2 (15.6 mil), ASTM D1640

Persoz hardness



— at 23C /50% RH, 10C/60% RH, ASTM D4366

Intercoat adhesion: 900 psi (6.2 MPa)



Primer + topcoat

primer

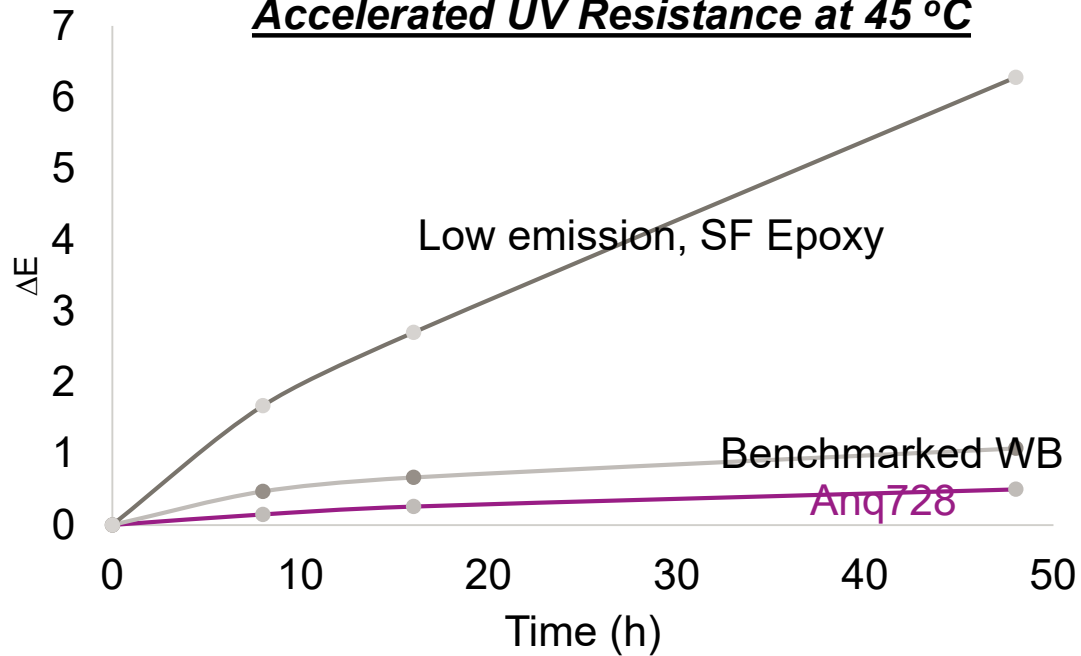
Anquamine 728 Topcoat Shows Excellent Aesthetics

- Aesthetics

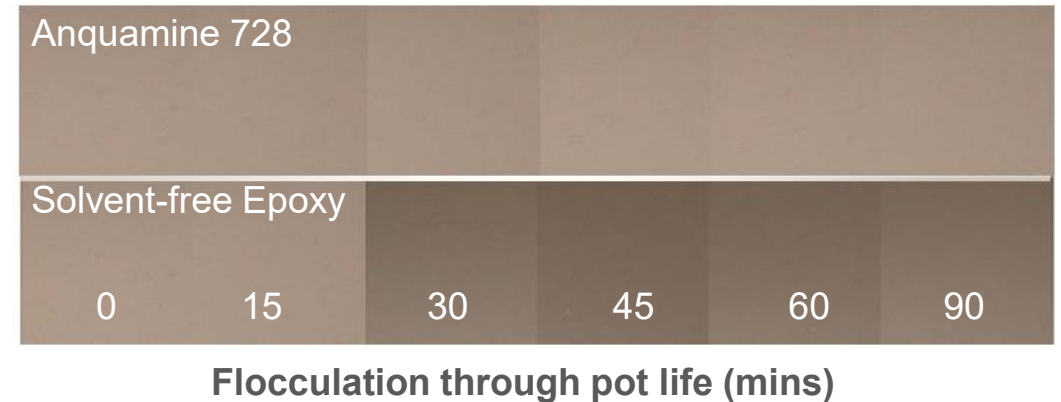
- Carbamation resistance at 10 °C
- Gloss >90 (60°)

- Color stability over pot-life
- UV stability

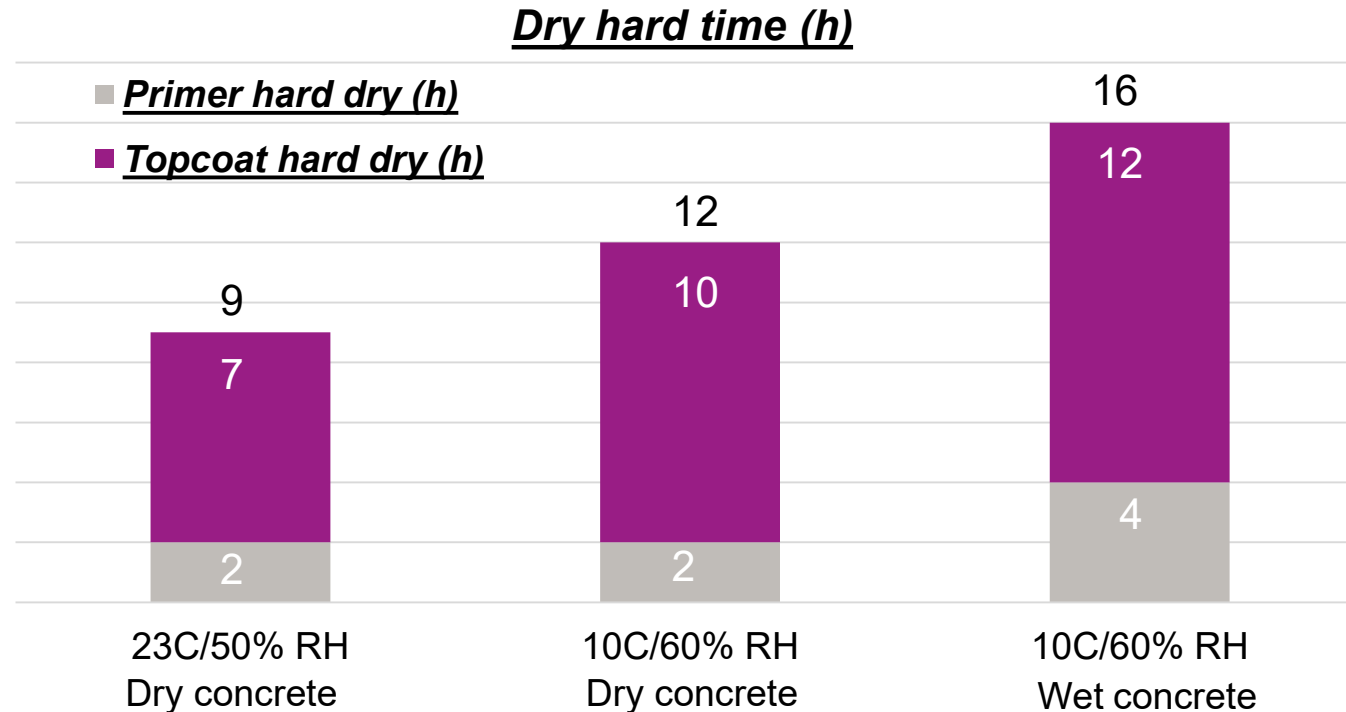
Accelerated UV Resistance at 45 °C



— White topcoats with diluted epoxy resin



Anquamine 728 One-Day Flooring System Shows High Performance



- Primer and Topcoat applied at WFT of 400 g/m² (15.6 mil), dry hard: ASTM D1640
- Adhesion test; ASTM D4541, bond strength >900 psi (6.2 MPa)

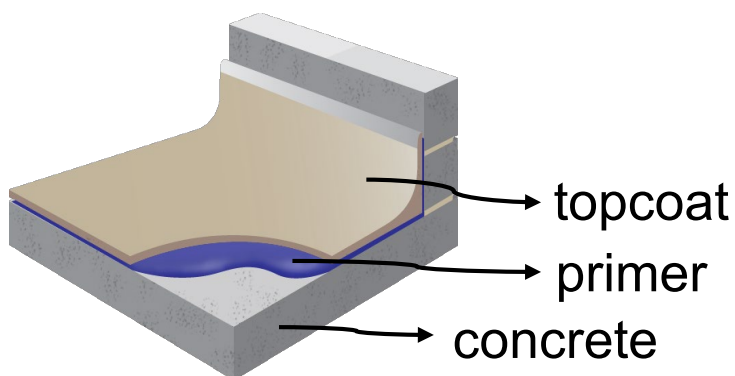
- Good aesthetics
- Excellent adhesion to concrete and primer/topcoat adhesion
- Ready to return to service in 24 hours

Anquamine® 728 — A solution for One-Day Flooring

delivers unique combination of fast cure *and* good aesthetics

One-Day Flooring

- Primer is critical – fast dry and fast cure
- Topcoat applied by the same shift and same crew
- Fast return to service in one day



1. Fast Cure (Primer) @10°C

- Dry hard time (h)
- Carbamation resistance
- 1-day floor installation
- Back-in-service Time (h)

2. Aesthetics (topcoat)

- UV durability
- Carbamation resistance
- Minimal flocculation
- Satin and gloss finishes

Anquamine 728
Ancarez AR-555

2-4 h

4-5

✓

16 h

Anquamine 728
Diluted LER

✓

✓

✓

✓



EVONIK

POWER TO CREATE