

ITW Futura Coatings FGD Linings



ITW Futura Coatings

ISO 9001



The logo graphic consists of three overlapping squares: a yellow one in the top-left, a red one in the bottom-left, and a blue one in the bottom-right. A black crosshair is superimposed over the squares, with the vertical line passing through the center of the yellow and red squares, and the horizontal line passing through the center of the red and blue squares.

ITW Futura Coatings

ITW – Illinois Tool Works

- 14.1 Billion Annual Sales
- 55,000 employees
- 750 separate business units
- Serving over 49 countries

Futura Coatings – Direct to End User Coatings
and Linings for Highly Corrosive and /or
Abrasive Environments



Who is Futura?

- Acquired by ITW in 2003
- Futura specializes in development and manufacturing of high performance Vinyl Esters, polyurethane and polyurea coatings, elastomers and structural resins. We also offer epoxies, primers, water-based systems & other specialty coatings.
- 30-years of experience and known as “The Proven Leader” in the industry



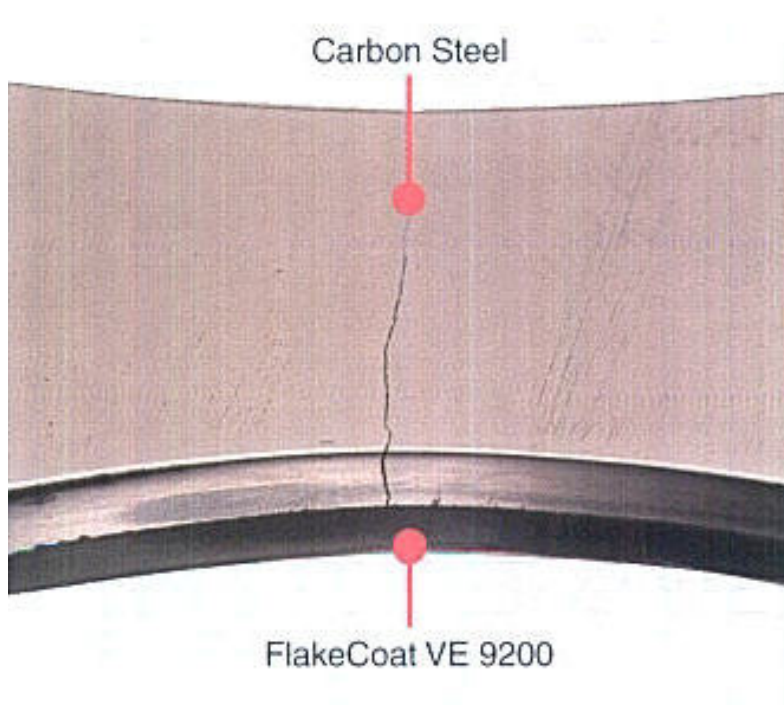
What Is A Vinyl Ester

- A Highly Cross Linked Epoxy Based Plastic With Excellent Chemical And Physical Properties.

General Characteristics

Vinyl Esters

- Flexibility and Adhesion
- Excellent performance in a cyclic environment



Excellent Adhesion and Flexibility

FlakeCoat Systems offer excellent adhesion to metal, concrete, and other substrates. They also demonstrate excellent flexibility and resistance to delamination due to flexing, thermal shock, or cycling. In a fatigue test, a dual amplitude stress of 35,550 lbs/in² was applied to carbon steel coated with a FlakeCoat System. Where the carbon steel started to crack at around the 600,000th cycle and eventually broke, no abnormalities were found in the coating.



Where Is It Used

- Inlet Zone
- Slurry Spray Distribution Levels
- Packed Grid Towers
- Open Spray Towers
- Absorbers/ Oxidation & Neutralization
- Mist Eliminator Framework
- Outlet Ducts to and including stack linings
- Auxiliary feed and holding tanks



Where Is It Used

- Trenches
- Sumps
- Thickeners/Clarifiers
- Primary containment
- Secondary Containment
- Wastewater Treatment vessels
- FGD External Vessel Coatings



What Are The Advantages Of Vinyl Esters

- Excellent resistance to acids
- Good alkaline resistance
- Unaffected by chloride concentrations
- Temperature resistance Bis A 190°F
Wet / 300°F Dry
- Temperature Resistance Novolac 266°F
Wet / 392°F Dry



Vinyl Esters Advantages

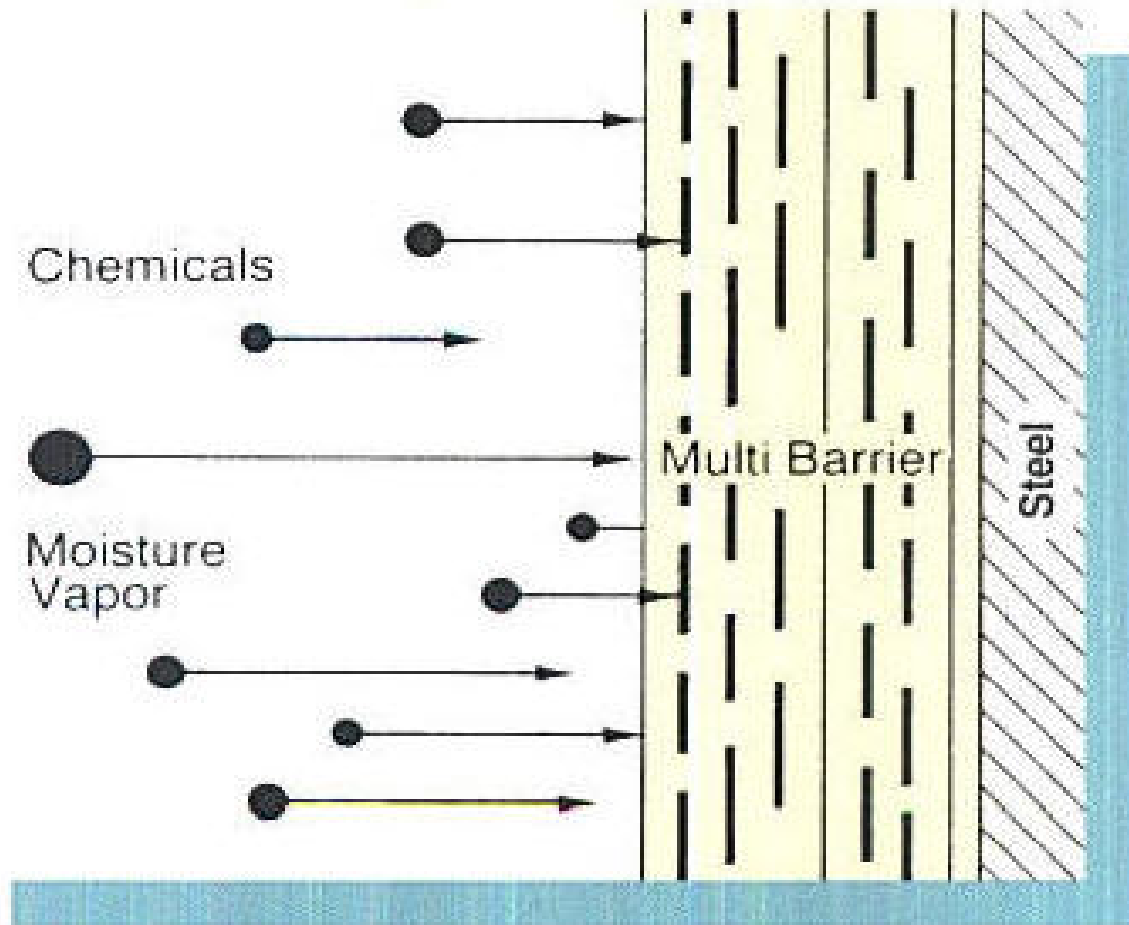
- Vinyl Esters have great physical properties on their own. There are many additives that can greatly enhance their performance and physical properties



Additives

- Glass Flake
- Roving
- Mats and Veil
- Paraffin

The Glass Flake Provides the Permeation Protection





Glass Flake

■ Permeation

PRODUCT DATA

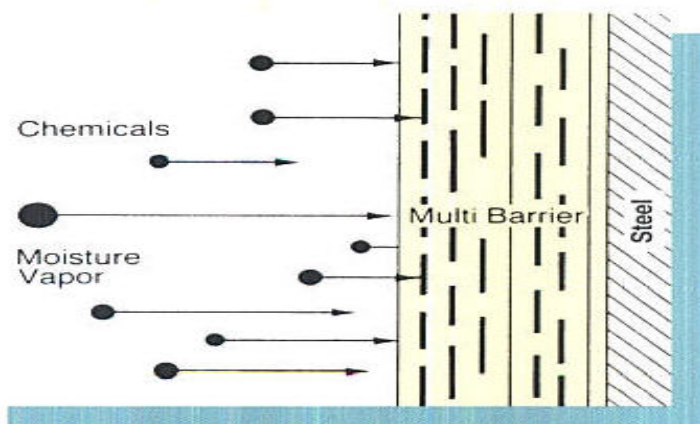
Typical Properties (VE 9310):

Resin type.....	Novolac Vinyl Ester
Specific gravity.....	1.6
Mixed viscosity.....	Putty
Tensile strength.....	5,688 psi
Flexural strength.....	11,376 psi
Elongation.....	0.4%
Adhesive tensile shear.....	1,778 psi
Heat resistance:	
Wet	266°F (130°C)
Dry	392°F (200°C)
Weight per gallon.....	13.3 lbs.
Coverage per gallon (@ 80 mils).....	15.5 sq.ft.
Permeability ASTM E-96 (@ 80°C).....	0.0006 perm.in.

Product Comparison

Advantages

- Glass Flake – Type
 - Fuji Flake, Flat Flakes, Better Wetting Characteristics
 - Silane / Surfactant used and flame sprayed to allow vinyl ester to adhere to the Fuji glass flake



Large Diameter Glass Flakes Overlap to Virtually Eliminate Water Vapor Permeation

The proprietary large diameter, flat profile glass flakes used in FlakeCoat Systems provide greater surface area and more overlap than the flakes used in other systems. Higher flake content combined with this greater overlap forms a virtually impermeable barrier, even to water molecules. In fact, FlakeCoat Systems offer the highest permeation resistance available today.



Product Comparison Advantages

- Glass Flake – Size
 - Bigger Flakes in Spray Material Makes Spray Material Interchangeable with Trowel Material

Additives



- Mats, Roving and Veil

The Mats and Roving act like rebar in concrete giving additional physical strength.

Veil is added on top of the Mat for an additional moisture barrier.

Additives

- Paraffin
- Top Coat Being Applied To The Door Of The Bailey Plant Absorber





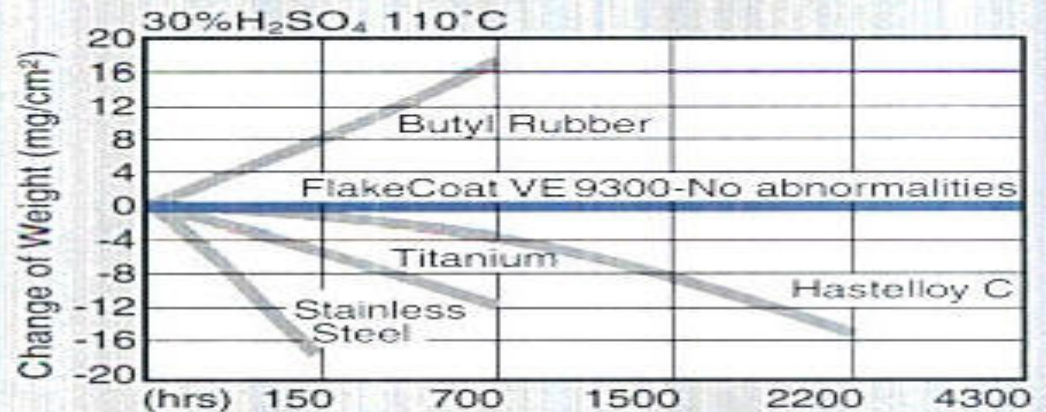
Product Comparison Advantages

- Top Coat
 - Seals system for a faster more thorough cure
 - Actually blocks off oxygen molecule from interrupting chemical reaction process created below system surface
 - Creates a smooth surface to minimize scale and/or sulfite build up on vertical walls
 - Serves as a great visual indicator during inspection to monitor high flood zones or potential wear areas

Comparison To Rubber And Alloys

- Corrosion Resistance

Corrosion Resistance: FlakeCoat™ Glass Flake Systems





System I

65 mils minimum dft

VE 9360 - Top Coat @ 8 – 12 mils dft

VE 9360 - Flake Glass @ 55 – 65 mils dft

VE 9310 Primer @ 2 – 4 mils dft

Carbon Steel – SSPC-SP5 with 3 – 4 mil anchor pattern



System II

100 mils minimum dft

VE 9360 Top Coat @ 8 – 12 mils dft

VE 9300 AC Mortar @ 45 – 65 mils dft

VE 9360 Flake Glass @ 55 – 65 mils dft

VE 9310 Primer @ 2 – 4 mils dft

Carbon Steel – SSPC-SP5 with 3 – 4 mil anchor pattern



System III

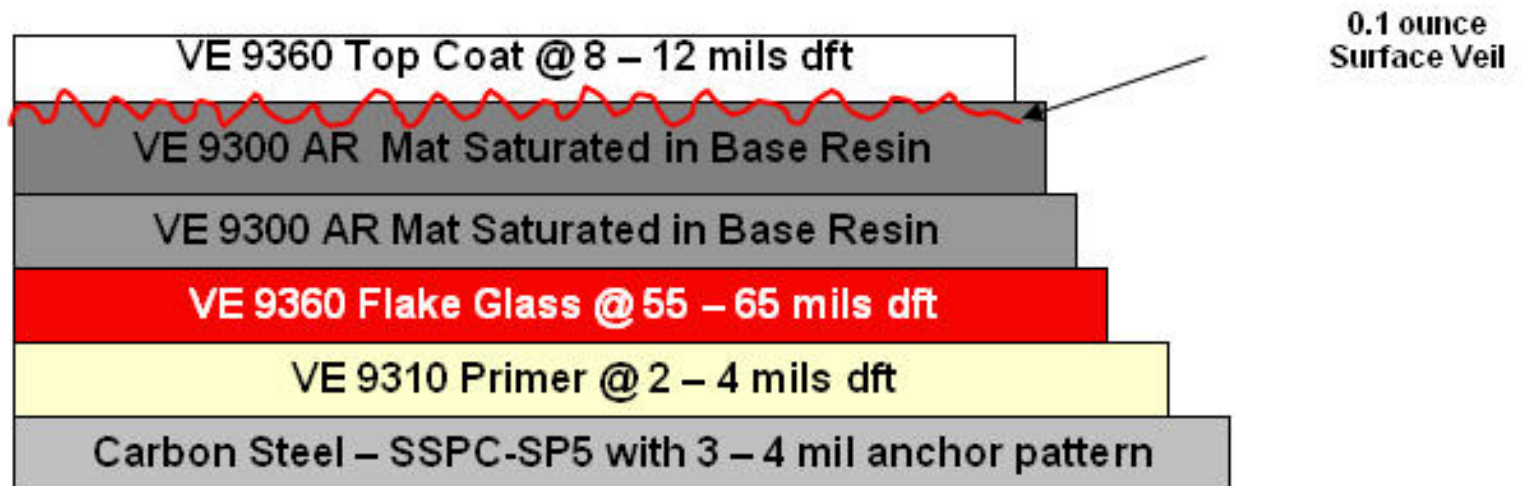
125 mils minimum dft





System IV

90 mils minimum dft





Futura Vinyl Ester Systems Can Be Custom Designed Based On The Following Criteria

- Chemical Exposure
- Temperature
- Immersion
- Abrasion / Impact
- Service Life / Customer's Real Expectation?
- Off-line Outage /System Considerations



Basic System Design Support

- Partnering review of all component process system requirements.
- Evaluation of areas of impingement, impact, corrosion, nozzle penetration, leading edges, reinforcement requirements.
- Support design technical specification, application procedures, turn-key requirements.
- Help define end-user outage concerns to insure long-term operational success.
- Implement a total evaluated cost approach to doing business.



Application Requirements

- Vinyl Ester Systems may be applied to substrates which vary from 40° – 110° F
- Humidity should be less than 85%
- Materials should be stored between 55° – 90°F

Application Guidelines

- Substrate should be prepared to an SSPC – SP 5 White Metal with a 3 – 4 mil profile
- VE 9360 and VE 9260 can be applied with plural component sprays to eliminate waste



FGD Design Consideration

- Spray Zone
 - Areas of High Impact and/or Sliding Abrasion
Use the AC or AR Systems



FGD Design Consideration

- Reaction Zone /
Aeration Zone
 - Area is usually an immersion area with mild to severe abrasion
- VE 9300 AC
Systems



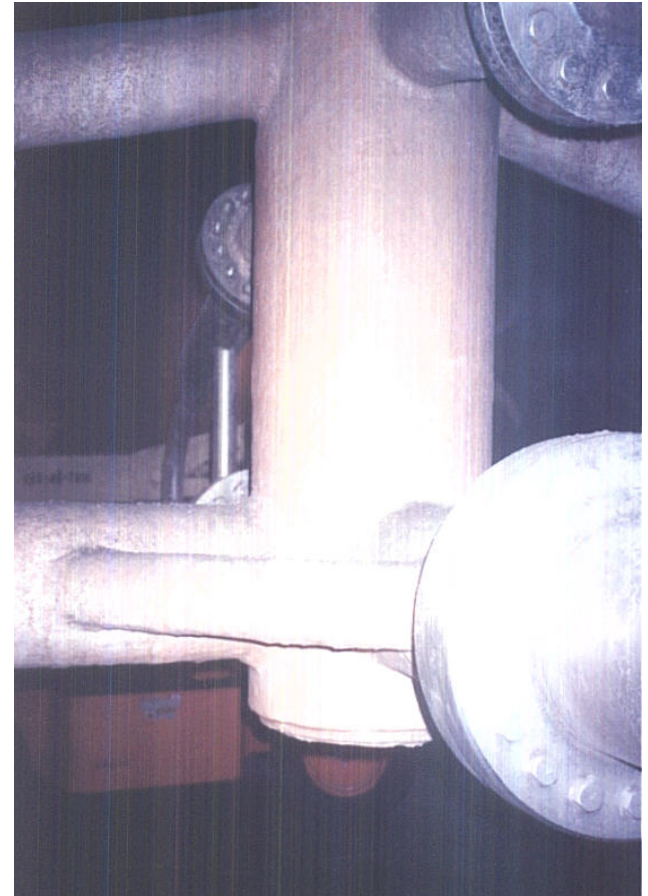
FGD Design Consideration

- Mist Eliminator, Outlet Duct, General Wall areas
 - Areas Are Usually Only Subject to Corrosion Concerns
- VE 9310 or VE 9360
- Using System 4 On all corners and edges



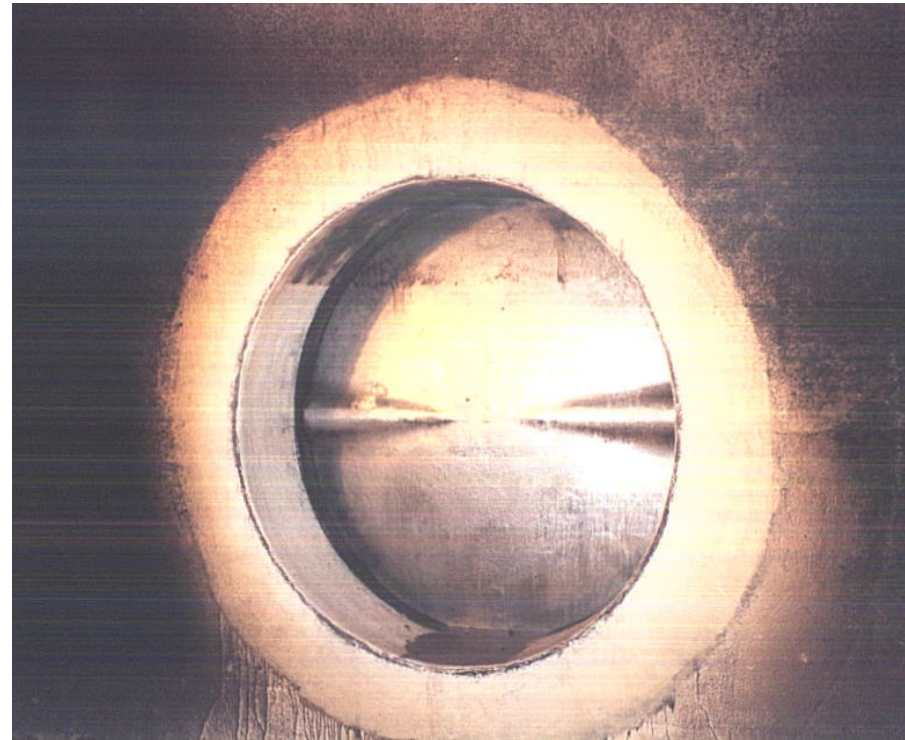
FGD Design Consideration

- Internals:
Structural
Shapes and
Corners
 - VE 9300 System 4



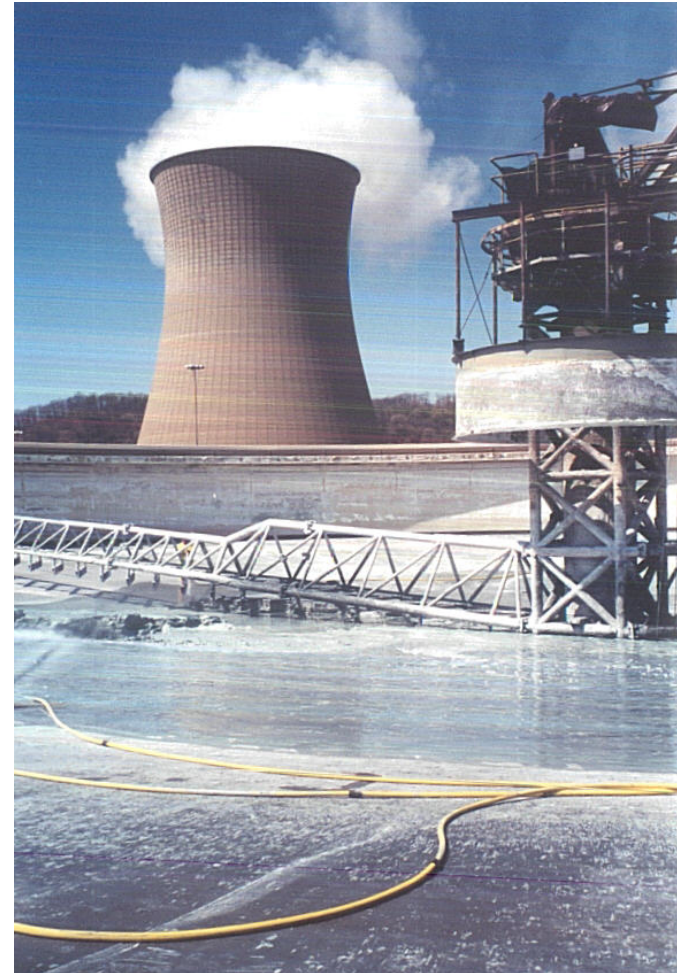
FGD Design Consideration

- Nozzles – Larger than 4" uses system III or V, smaller uses FRP inserts or may be alloy



FGD Peripherals

- Clarifiers
- Aux Tanks
- Chimneys / Flues
- Secondary Containment



Concrete Floor Clarifiers A New Idea

- Vinyl Ester Flakeglass for the Steel Walls



Concrete Floor Clarifiers

A New Idea

- Spray Applied Elastomer for the Floor





Concrete Floor Clarifiers

A New Idea

- Advantages

- Highest Level of Permeation Protection on Steel
- Flexibility to bridge cracks and expansion joints in Concrete Floor
- A Built in Expansion Joint Between Dissimilar Systems

Concrete Floor Clarifiers A New Idea

- Elastomer Does Not Require Atmospheric Protection



DRY FGD SYSTEMS

- The Acid and Chemical Resistance Also Provides Excellent Protection in Baghouses and Dry Scrubbers





Value Proposition

Why ITW Futura?

- World-Class Organization
- Committed to Power Industry
- Proven track records of success
- Core competency business
- Partnering with customers
- Engineering Capable
- Turn-key applications
- Long-term inspection services
- Technical services
- Economical advantage
- Many years Operational Experience in FGD Business



Conclusion

- Excellent coatings for highly corrosive FGD environments
- Economic advantage
- Excellent permeation resistance
- Systems can be modified or mixed to be made application specific
- Proper Application = ***Long Term Reliable Service***