

McIlvaine Company January 2014 Hot Topic Hour on "Material Considerations for Maintaining FGD Infrastructure"

This presentation reviews the environmental considerations of fossil fuel generation and provides an in depth overview of the materials used to increase life expectancy. Corrosion resistant organic and inorganic technologies are covered with field applications and "real world" solutions throughout.







Who We Are





- □ Founded in 1899
- Dedicated to Engineered Solutions based upon:
 - Inorganic technology
 - Organic technology
- Headquartered in Pittsburgh, PA
- Departions in all 50 states, Canada, Latin America, Asia and Europe
- Licensed manufacturing in key locations worldwide
- Privately owned and operated



Material Considerations for Maintaining FGD Infrastructure







Power Generation



Criteria for System Selection

- Chemical Environment
- Temperature (normal and upset)
- Type of Substrate
- Physical Forces/Stresses
- Maintenance or New Construction
- Cost



Systems

- Acid-Brick Linings
- Membrane/Gunite Linings
- Organic Linings
- Castable Polymer Concretes









Gunite Linings

- Lightweight/thermally insulating for steel stacks & ducts
- Low permeance when used with a membrane – "dual" protection
- Excellent chemical & temperature resistance
- Cost effective



REFRACTORY LININGS

Composition	Density	<u>Temp.</u>
Potassium Silicate	125 pcf	1250ºF
Potassium Silicate	98 pcf	1600ºF
Calcium Aluminate	131 pcf	2200ºF
	Composition Potassium Silicate Potassium Silicate	CompositionDensityPotassium Silicate125 pcfPotassium Silicate98 pcfCalcium Aluminate131 pcf





High Temperature Membrane





Gunite Application of Refractory



Organic Linings for FGD

- Interlocking fiber matrix and/or glass flake provides
 - Low permeability
 - Enhanced tensile & flexural strengths
- Excellent chemical & abrasion resistance
- Selection of polymer formulations depending upon service conditions
- Fast, economical, spray application using conventional equipment reduces installation downtime





Fibrecrete Linings



- •Bis-phenol A
- •Bis-phenol F
- Novolak
- •Bis-A & NovolaK Vinyl-Ester





Cross-Section of Interlocking Fiber Network





Analysis by SEM of a Fiber-Reinforced Lining in Cross-Section---in Service







Corrosion Resistance

Permeance is the most important factor....

- <u>Do not</u> let other properties lead you away from the primary purpose of the selected material.
- Ask the relevant questions:
 - •Does the material supplier have chemical resistance data on the products of interest ?
 - •What is the permeance of the protective coating system at specified application thickness?





Product Comparisons

	<u>Permeance</u>	Permeability
	<u>(Perms)</u>	(Perm-inches)
Unfilled vinyl ester resin	0.7700	0.0154 @ 20 mils DFT
Flake Glass vinyl esters with treated flakes	0.0028	0.0002 @ 70 mils DFT
Standard flake glass vinyl esters	0.0086	0.0006 @ 70 mils DFT
Mica filled vinyl esters	0.0628	0.0022 @ 35 mils DFT
Urethane asphalt membrane	0.0800	0.0048 @ 60 mils DFT
1/8" woven roving reinforced Bis A epoxy	0.0136	0.0017 @ 125 mils DFT
FibreCrete novolak vinyl ester with topcoat	0.0098	0.0005 @ 31/7 mils DFT
FibreCrete novolak vinyl ester without topcoat	0.0291	0.00081 @ 31 mils DFT
FibreCrete novolak epoxy with topcoat	0.0036	0.00018 @ 40/10 mils DFT
FibreCrete novolak epoxy without topcoat	0.0037	0.00015 @ 40 mils DFT



Airless Spray Equipment



Graco 56:1 Pump



Pistol Grip Flow Gun



Application of Fiber-Reinforced Lining in Flue Gas Scrubber Duct







Thickener Tank



Mist Eliminator





Castable Polymer Concrete

- Various Polymer Chemistries available
- Chemical Resistance
- Temperature Resistance
- Strengths up to 5 times greater than standard concrete
- Utilizes standard concrete practices in terms of forming, placement and reinforcement
- Fast, economical installation 5 cubic yards/hour using continuous mixer
- Primary used for refurbishing stack floors



Rehabilitation of Chimney Floor with Inorganic Polymer Concrete





Thank you for your time!

Please contact us with any additional questions: <u>www.sauereisen.com</u> <u>Questions@sauereisen.com</u> 412.062.0202

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