

Rehabilitating Clarifiers

WWOA Show

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David Dehart – International
Paint & Devoe Coatings

Function of Protective Coatings

They are coatings applied to a variety of surfaces to protect the substrate exposed to various environments. In clarifiers the two main environments are immersion and chemical.

Corrosion Protection

- Cathodic Protection is when a product such as zinc is applied direct to steel and sacrifices itself to protect the steel.
- Barrier Protection is a coating film created to protect against moisture and chemicals from reaching the steel surface.
- Inhibitive Protection is when an agent is used in a product to migrate to the point of corrosion and interfere with the corrosion mechanism.



Corrosion on Steel

Corrosion of steel in immersion can happen rapidly!



Coating failure in immersion

What happened here?

Clarifier Inspection

- Approximately once a year
 - Level of failure
 - Heavy corrosion
 - Rust staining
 - Mechanical damage

Corrosion at Rivets



Rust Staining



Corrosion Evaluation

- Heavy Corrosion = Loss of Steel
- Rust Staining = Identify Source
- Intercoat Delamination = Why?

Decision to Repair

- Corrosion at 10-15% = Potential Repair
- Less than 10-15% = Spot Repair
- Location of Corrosion = Main Support
- Availability of Clarifier
- Cost of Repair = Budgets

Factors Affecting Coating Performance

- Structural Design
- Coating Selection
- Surface Preparation
- Application



Surface Preparation is Important

- As high as 70% of all premature coating failures can be directly attributed to inadequate surface preparation that affects coating adhesion!

What are the Goals of Surface Preparation?

To provide a surface suitable for painting by:

- Removing contamination
- Providing a surface profile
- Removing or smoothening irregularities (pits, projections, sharp edges)
- Removing tightly bound mill scale & rust

Iron and Steel

■ Why Clean

- Mill Scale
- Rust
- Oil/Grease
- Dirt
- Soluble Salts
- No Profile

■ How Clean

- Solvent Clean (SP1)
- Hand Tool Clean (SP2)
- Power Tool Clean (SP3)
- Abrasive Blast (SP5, SP10
SP6, SP7)
- Water Blast (RP-01-72)

SSPC Cleaning Standards

- **SP1 Solvent Cleaning:** Removal of oil, grease, dirt, & salts by cleaning with solvent, water, detergent, alkali or steam.
- **SP2/SP3 Hand & Power Tool Cleaning:** Removes loose paint, loose mill scale and loose paint by chipping, scraping, sanding and wire brushing.
- **SP11 Power Tool Cleaning to Bare Metal:** Removal of all visible oil, grease, dirt, mill scale, rust, paint, and contaminants and to retain or produce a surface profile.

Power Tool Cleaning (Grinding Disk)



SP3

Power Tool Cleaning to White Metal (Needle Gun)



SP-11

SSPC Blasting Standards

- **SP5 White Metal Blast:** Removal of all oil, grease, rust, mill scale, paint and contaminants by blast cleaning by wheel or nozzle (dry or wet) using sand, grit or shot.
- **SP10 Near White Blast:** Same as SP5 but 5% of area allowed residual shadows
- **SP6 Commercial Blast:** Same as SP5 but 1/3 of area allowed residual shadows
- **SP7 Brush Off Blast:** Blasting to remove all except tightly adhering residues of mill scale, rust and coatings.

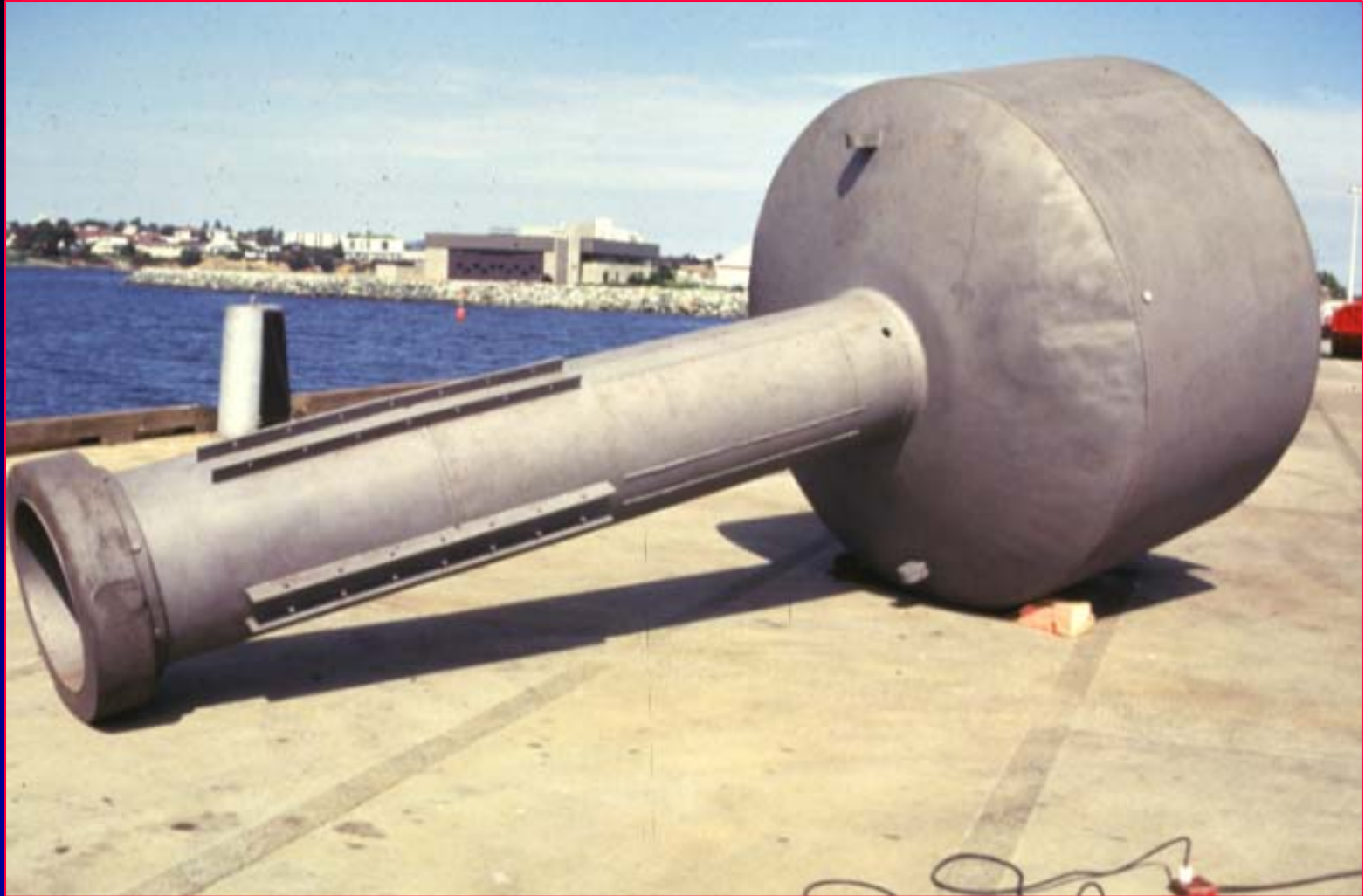
Preparing a Commercial Blast



Close Up: Commercial Blast



Near White Metal Blast



Close Up: Near White Blast



SP 10

White Metal Blast



SP 5

Other Standards

- **NACE RP-01-72: Water Blasting** - Removal of oil, grease, dirt, loose rust, loose mill scale, and loose paint by water at pressures of 2500 - 5000 psi at flow rates of 4 - 14 gallons per minute. This will not produce a surface profile.

Epoxy Coatings

- Workhorse in clarifier work. Also available in a glass reinforced version for increased abrasion resistance.
- Surface tolerant, work well in immersion, chemical resistant, high solids, self-priming, and exceptional corrosion resistance.
- Some epoxies have fast cure to immersion times, cure in cooler weather, and thick film systems available.
- Most epoxies applied conventionally.

The Product Specification

- Usually supplied by an Engineering Firm. It sets the standard on what, why, when, where, and how the coatings are to be applied.
- As a general rule, most coating systems selected should have 15 years of service life.
- Be sure to spell out specifics and expectations. Many systems will work, but they need to meet the needs of the utility.
- (time of year, cure to immersion, abrasion resistance, regulations, etc.)

Important Stuff

- Stripe coating
- In house maintenance
- Recoat windows
- Cure to immersion
- Weather/time of year
- Dew point/humidity
- Low temperature cure epoxies
- Chain of command
- Amine blush
- Freezing temperatures

Stripe Coating

Stripe coating is an essential part to many industrial coating applications. Areas which are hard to get a full coat of paint on such as corners, edges, flanges, nuts, bolts, etc. Typically a brush coat of the specified product is worked in or applied to ensure enough coating is on the surface to provide adequate protection. The subsequent finish coat are applied afterwards.

In house maintenance

Some utilities have under taken or considered doing minor repairs in house. It would be a good idea to consult with a coating representative to work through the specifics in regard to mixing, surface preparation, limits, tools, and product selection.



Missed the recoat window

Epoxies have a fixed time they can be recoated on the front end and back end. They are also temperature driven. Be sure to know what the curing tables say for a particular product.

Cure to immersion

Not all epoxies can be put into service at the same rate of time. If your job requires a quick return to service, there are epoxies available which can go into service in less than 24 hours (though susceptible to mechanical damage) under normal conditions. Some epoxy coatings may require 2-3 weeks if the weather turns colder. The product cost can be very similar.

Weather/time of year

- When it is cold, epoxies will stop curing or cure very slowly.
- Cold cure additives and low temperature curing agents are available, but they have limits as well. These should be used on a limited basis. When it is cold (below 40-50 degrees F) large scale painting should try and be avoided.
- When temperatures are extreme steel surfaces can become very hot. Avoid surface temps above 120F or higher. If 95F outside...avoid painting!

Dew Point/Humidity

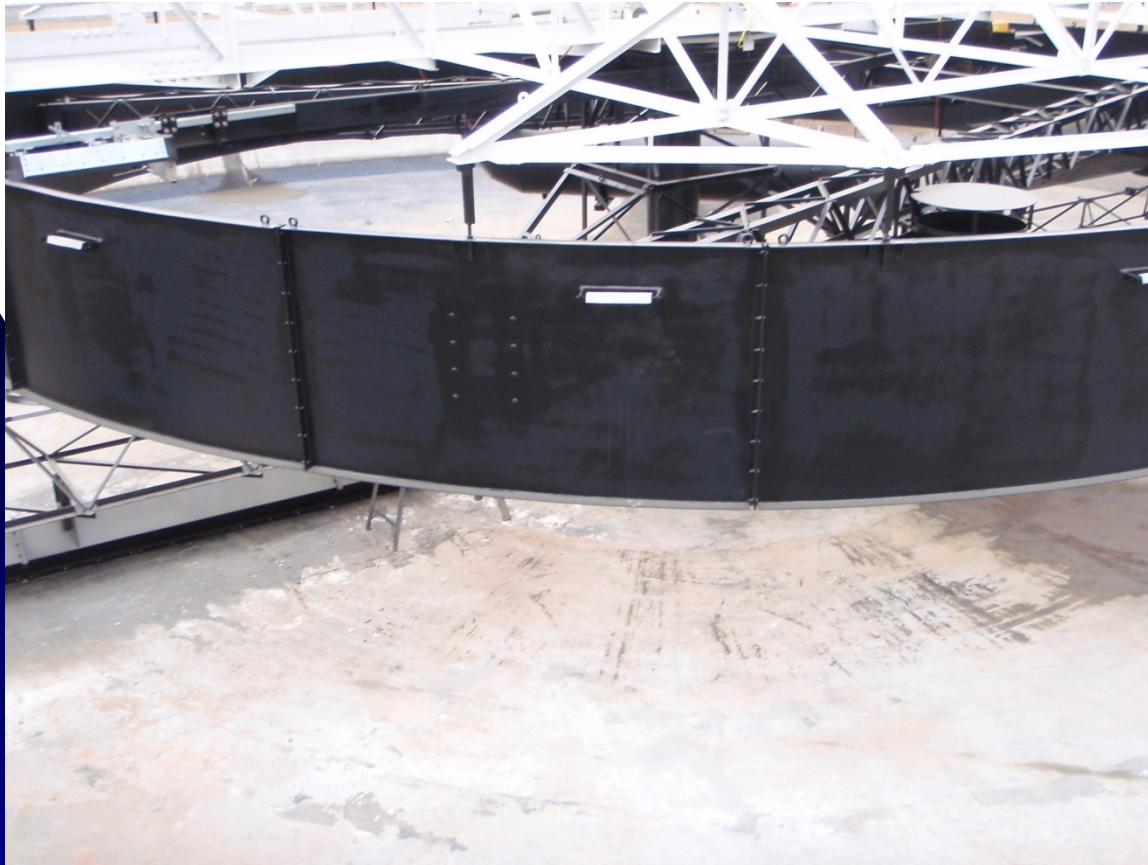
- The surface temperature must be 5 degrees F above the dew point. Otherwise, condensation will form on the surface which is detrimental to good painting practice.
- When humidity is high there is a lot of moisture in the air. When you get over 75% humidity you have to be aware that coatings don't cure as well as 50 degrees F. Most painting of any kind should not take place when relative humidity is 85% or better.

Low temperature cure epoxies

- Low temperature cure epoxies exist which will cure fairly quickly down to 20 degrees F. These systems can be expensive and require special forms of equipment for application.
- Some epoxies will cure at 0 degrees F, but will require a long period of time to cure for service.
- Applying these coatings also requires much attention to the conditions and extra detail for safety concerns.

Chain of command

- There are a variety of relationships which take place within the coatings environment. During the course of any job you may have the Utility, Engineer, General Contractor, Painting Company, and Coatings Supplier involved. Because issues/questions arise it is important to understand who reports to who and how communication should be carried forward.



Amine Blush

When using epoxy in cool moist conditions, epoxies can release a blush which migrates to the surface. It has a “wax like” look and must be removed before applying additional coats.

Freezing temperatures

- When it is freezing outside, moisture on the surface freezes and turns to ice which cannot always be seen.
- Though some products may state they can be applied at sub freezing conditions in general it is good practice to avoid these conditions.
- Projects are best completed and products reach maximum performance under normal painting conditions.



Thank You!

Questions?