

COATING SELECTION FOR COASTAL ENVIRONMENTS

Structures located in coastal environments are exposed to some of the most aggressive atmospheric conditions encountered in construction and maintenance. Salt-laden air, persistent moisture, ultraviolet (UV) radiation, wind-driven particles, and biological contaminants can significantly accelerate coating degradation and substrate corrosion if surfaces are not properly protected.

Selecting the appropriate coating system for coastal exposure requires careful consideration of environmental conditions, substrate type, surface preparation, and coating performance characteristics. When properly designed and applied, protective coatings can significantly extend the service life of building components while reducing long-term maintenance costs.

Environmental Challenges in Coastal Areas

Coastal environments present a combination of environmental stressors that can accelerate deterioration of both coatings and substrates.



Coastal Environments:
Major Challenges for Exterior Paint

- 1. Salt Exposure**
Corrosion and paint damage from salt spray and deposits.
- 2. High Humidity & Moisture**
• Moisture issues, mildew, and peeling.
- 3. Intense UV Exposure**
• Fading, chalking, and UV damage.
- 4. Wind-Driven Abrasion**
• Erosion from sand, dust, and wind.
- 5. Bird Droppings & Contaminants**
• Staining and damage from droppings and mold.

- **Salt Exposure:** Airborne salt is one of the primary challenges in coastal regions. Ocean spray and wind carry microscopic salt particles that deposit on building surfaces. These salt deposits are highly hygroscopic, meaning they attract and retain moisture from the surrounding air.

As a result, surfaces in coastal areas often remain damp for extended periods, even when rainfall is not present. This persistent moisture increases the risk of corrosion on metal substrates and can promote coating blistering or adhesion loss if salts are trapped beneath the coating film.

- **High Humidity and Moisture:** Coastal environments typically experience elevated humidity levels and frequent condensation. Moisture can penetrate coatings through microscopic pores or defects, leading to corrosion of ferrous metals, efflorescence on masonry substrates, reduced coating adhesion, and accelerated coating breakdown.

In areas close to the shoreline, surfaces may also be exposed to direct salt spray during storms or high winds.

- **Ultraviolet (UV) Exposure:** Many coastal regions receive intense and prolonged sunlight. UV radiation can gradually break down certain coating binders, leading to chalk formation, color fading, gloss reduction, and loss of film integrity over time

Coatings selected for coastal environments must therefore provide both corrosion resistance and strong UV durability.

- **Wind-Driven Abrasion:** Coastal winds often carry sand, dust, and other airborne particles that can gradually erode coating films. Over time, this mechanical abrasion can thin protective films and expose underlying substrates.
- **Bird Droppings and Biological Contaminants:** Coastal environments often have significant populations of seabirds such as seagulls. Bird droppings can accumulate on exterior surfaces including roofs, railings, siding, and architectural elements.

Bird droppings contain uric acid, which can be moderately acidic and may interact with paint films if left on the surface for extended periods. Over time, this exposure can contribute to localized staining, gloss loss, surface etching, and softening of the coating film. These effects are often more visible on darker colors and higher-sheen coatings. When droppings remain on surfaces exposed to sunlight, the combination of heat and acidity can accelerate the potential for staining or coating damage.

In coastal areas where bird activity is common, periodic cleaning of exterior surfaces helps reduce the likelihood of permanent staining or localized coating deterioration.

Importance of Proper Surface Preparation

Salt deposits on surfaces can interfere with coating adhesion and contribute to osmotic blistering—a type of bubbling that happens when trapped moisture pushes the coating upward—after application. Before coating, surfaces should be thoroughly cleaned to remove soluble salts. Common cleaning methods include freshwater washing or pressure washing, detergent-assisted cleaning, and abrasive blasting for metal surfaces. In some cases, multiple wash cycles may be required to adequately remove salt contamination.

Selecting Coatings for Coastal Exposure

Coating systems used in coastal environments must provide resistance to moisture intrusion, salt exposure, and UV degradation.

For steel and other ferrous metals, corrosion-resistant primers play a critical role in protecting the substrate. These primers provide strong adhesion and barrier protection that helps prevent corrosion initiation.

In multi-layer systems, intermediate coats help build film thickness and improve overall barrier protection. Epoxy intermediate coatings are commonly used because they provide excellent chemical resistance and low permeability to moisture.

Because many primers and epoxies are sensitive to UV exposure, a durable topcoat is typically required for exterior coastal applications. Common topcoat technologies include acrylic coatings, polyurethane coatings, and polysiloxane coatings. These coatings provide superior resistance to sunlight, color fading, and chalking.

Maintenance Considerations

Even the best coating systems require periodic inspection and maintenance in coastal environments. Routine maintenance should include:

- Washing surfaces to remove accumulated salt deposits
- Cleaning bird droppings and biological contaminants promptly
- Inspecting for coating damage or corrosion
- Repairing localized damage before it spreads

Regular cleaning is particularly important in coastal environments because salt, bird droppings, and airborne contaminants can gradually accumulate and affect coating appearance and performance.

Key Takeaways

Coastal environments present a unique set of challenges for protective coatings due to the combined effects of salt exposure, moisture, ultraviolet radiation, wind-driven abrasion, and biological contaminants such as bird droppings. Successful coating performance in these conditions depends on selecting materials specifically designed to withstand these stressors and ensuring that surfaces are properly prepared before application.

By carefully evaluating environmental conditions, selecting appropriate coating systems, and maintaining surfaces through routine cleaning and inspection, building owners and maintenance professionals can significantly improve the durability and longevity of coatings applied in coastal environments. Effective coating selection not only protects structural materials from corrosion and degradation but also helps preserve the appearance and value of buildings exposed to harsh coastal conditions.

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