Choosing the right finish for coastal projects

Seaside and coastal areas are beautiful locations for commercial and residential buildings, but also pose the greatest challenges in protecting exterior-facing architectural aluminum products from corrosion. Without proper precautions and finishes, corrosion to these aluminum components can damage the building envelope's structural integrity, leading to systemic failure.

Exploration Tower at Port Canaveral

One of the most aggressive outdoor environments for aluminum is the seacoast. Of the seacoasts, Florida's coastal regions represent the most corrosive in the continental United States, with Cape Canaveral cited as the most corrosive atmospheric environment.

Corrosion rates vary from place to place and during different times at the same location. Such wide variability makes definitive conclusions difficult.

The primary variables affecting corrosion rates near the coast are the salt content in the air, the time of wetness of the metal surface, the temperature and the level of other atmospheric pollutants. Several environmental factors control these variables, including distance to the ocean, elevation, wind direction, wave action, rainfall, humidity, the degree of shelter and the level of industrial air pollution.

Durable Finishes

The Tampa Museum of Art

Painted coatings and anodized finishes are among the most durable finishes for exterior-facing architectural aluminum products.

As a prominent part of the building's exterior, the coated aluminum adds color and design to the project. This coating also protects the building from unsympathetic surroundings.

When selecting a coating to withstand harsh corrosive environments, one should specify either:

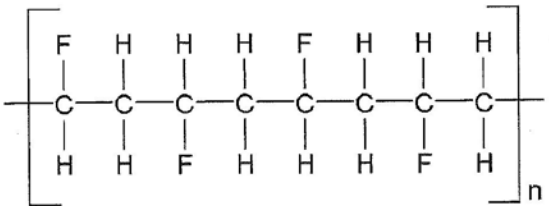
- the highest-performing organic paint coating that meets AAMA 2605-13, *Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels*; or
- a Class I anodize coating that meets AAMA 611-14, *Voluntary Specification for Anodized Architectural Aluminum*.

These two options continue to set the highest standard for architectural coatings, especially in a coastal or highly corrosive environment.

Paint

High-performance 70 percent PVDF coatings offer the capability to select nearly any conceivable color or combination of colors, while shielding the building against weathering, pollution and aging.

The carbon-fluorine bond used in 70 percent PVDF coating is one of the strongest known. These paint coatings can withstand enduring and intense UV radiation, which supports their long-term color- and gloss-retention, and chalk-resistance.



The chemical structure of polyvinylidene fluoride (PVDF)

The first, and one of the most important, defenses against a paint failure is proper pretreatment of the aluminum. Without proper pretreatment, premature failure of the finish is almost guaranteed. Paint systems are designed to be applied over clean metal that has been properly pretreated. Pretreatment of the aluminum building components to be used in severely corrosive or coastal environments is crucial.

The most time-tested, proven pretreatment system for architectural aluminum products is a chrome phosphate conversion coating. This process conforms to Type B, Method 5 of ASTM D1730-09 (Reapproved 2014), *Standard Practices for Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting*, as required by AAMA 2605-13.

Offering the longest lifecycle and true sustainability, chrome phosphate conversion coatings continue to be recognized by the world-class coating manufacturers, Akzo-Nobel, PPG, and Valspar, as the most effective, robust pretreatments for aluminum. As a result, products installed along the seacoast and in other harsh industrial environments may not be warranted—or the warranty length and coverage could be compromised—when a chrome pretreatment system is not employed.

These highest-performing 70 percent PVDF are required to perform to rigorous testing performance standards, including more than 4,000 hours of salt spray, and heat- and humidity-resistance to meet the AAMA 2605-13 specification.

Special Considerations
The shape and machining of the architectural aluminum products also may facilitate or deter corrosion. As examples:

- Machined holes and cut ends of factory-finished aluminum components are protected by thin, naturally forming aluminum oxide. This oxide, while tenacious in its bond to the underlying aluminum substrate, may be susceptible to attack from strong cleaners or heavy salt deposits.
- Hems and seams on aluminum components may be formed in a way that will collect sand. With movement, over time, this sand can erode away the painted coating or anodized finish.
- Components may be shaped with areas that are left holding pooling or ponding water. This often can become a major issue for corrosion.
- Specific to curtainwall and window systems' aluminum framing, ensure the weeps are large enough to avoid becoming plugged by salt deposits.

Anodize
When extreme hardness is required for the aluminum building components, such as in high-traffic areas like entranceways and railings, an anodized aluminum finish should be specified to meet AAMA 611-14. The hardness of anodized aluminum rivals that of the diamond. (On the Moh scale of hardness, a diamond is 10 and anodized aluminum is 9.)


CasaMagna Marriott Cancun Resort

Architectural anodize is specified for its natural beauty, but also for its long life and low maintenance. It provides excellent wear and abrasion resistance with minimal maintenance in most environments. It resists the ravages of time, temperature, corrosion, humidity and warping.

Anodized aluminum should meet the strict guidelines of Class I specifications of AAMA 611-14, including a minimum oxide coating thickness of 0.018 mm (0.7 mil); minimum of 10 years color retention on the South Florida on-fence testing site; and 3,000 hours corrosion resistance.

Cleaning and maintenance
Studies have shown increasing levels of atmospheric pollution can have a negative effect on finish longevity in the absence of periodic maintenance. Runoff from adjacent site materials must be considered in a corrosion prevention plan. For example, mortar, cement and even gypsum dust can accumulate as alkaline deposits on aluminum surfaces and must be promptly rinsed. This is especially true of mill finish or anodized surfaces. While somewhat more resistant to alkaline attack than anodized surfaces, high-performance paint finishes can be damaged by rough attempts to remove such buildup.

AAMA 609 and 610-15, *Cleaning and Maintenance Guide for Architecturally Finished Aluminum*, and AAMA CW 10-15, *Care and Handling of Architectural Aluminum from Shop to Site*, are general guides for these precautions and cleaning activities.

Corrosion of architectural aluminum materials is a fact that must be recognized; proper steps must be taken to minimize the potential for its occurrence. With these building considerations

and preventive measures in place, finished architectural aluminum retains its intended look and long life, while providing the desired performance in the harshest environments, including the highly-corrosive seacoast. These qualities reduce the need to replace materials and components, conserve resources, optimize labor and save money.

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