

## Maintenance and Restoration of Architectural Anodized Aluminum

**Most architectural aluminum produced in the last 50 years is either protected with an anodized coating or a painted finish. This technical summary applies only to anodized aluminum.**

### Anodized Aluminum (Duranodic finishes)

The anodizing of architectural aluminum is a process used to protect the aluminum substrate from corrosion. Bare or uncoated aluminum extrusions (also referred to as mil finished aluminum) rapidly begins to oxidize when exposed to air and combines with oxygen and humidity to naturally form a coating of **aluminum oxide**, which typically appears as a white film or deposit, and thus starts the early stages of corrosion.

Today's preferred method of protecting architectural aluminum alloys from corrosion is to anodize by forming a uniform layer of aluminum oxide (1 to 3 microns thick) by anodizing in a sulfuric or chromic acid bath while subjecting the aluminum substrate to an electric current. This oxide film is then sealed with hot aqueous solutions and a dye is added to create different colors of dark brown (think John Hancock center), black anodizing (i.e., Willis Tower) or gold (think retro 60's shower doors). Silver anodized aluminum does not have a dye added and is known as "clear anodized" (Mercedes Benz Superdome).

Aluminum oxide is a near diamond hardness (on the Mohs hardness scale it is a 9, diamonds are the hardest, at 10). Aluminum oxide in its mineral form is used for abrasive polishing and is so hard it is used to make sandpaper. Other than diamonds, it is among the hardest mineral in the world. It is difficult to control coating weight, thickness, and color uniformity from panel to panel. The Architectural Aluminum Association has standards for color variation and thickness of the anodic coating, and allow for a large variance in color or slightly apparent "waviness", as this is a natural characteristic of anodized aluminum, regardless of color.

Although the aluminum oxide film is very durable and has incredible abrasion resistance, the manufacturing process is inherently susceptible to thickness variations and thus corrosion resistance varies from panel to panel, window frame to frame. Over time, microscopic portions of the sealer deteriorate or wear off from abrasion and weather and give pollutants such as runoff from adjacent concrete a reactive surface to combine with.



*Years of oxidation removed with safe acid free restoration cleaning.*



*Clear anodized aluminum panels cleaned, and center panel sealed*



*Before*



*After Clear silver anodized curtainwall restored*

## **COMMON CAUSES OF SURFACE DETERIORATION**

Deterioration of exterior anodized finishes occurs from inorganic deposits from silicates emanating from rain runoff, (especially from adjacent surfaces such as precast concrete), silicone caulk sealants, or contact with dissimilar metals and metallic salts.

“Panel edge staining” is a naturally occurring problem that happens to anodized aluminum paneling and facades. These semi-permanent stains dull the anodized surface. Organic staining is the by-product of years of acid rain, humidity, pollutants from airborne hydrocarbons, auto exhaust combusted exhaust hydrocarbons, and runoff from window cleaning operations where the specifications call for window cleaning only. The problem can be further compounded by oils from sealant leeching at silicone caulk joints, which pollutants adhere to.

Other deterioration occurs from UV (Sunlight), neglect, or deterioration of the factory applied finish due to excessive oxidation, scratches, vandalism, acid rain, and abrasion such as a high volume of pedestrian traffic. Entrances and doors receive the most abuse and thus, often require higher frequencies of re-painting if the anodized finish is worn off.



*John Hancock Center has both bronze anodized aluminum and black anodized panels. Years of oxidation appears as white haze and streaks.*

### **Our Process:**

Our metal cleaning process starts by using **Purple Magic**, a safe biodegradable enzyme cleaner specially developed by **Service One** for cleaning anodized and powder coated aluminum. Purple Magic removes stains, sealant leeching, and weathering. Additional non-abrasive powders can be added for deep cleaning. Detail cleaning of knobs, screen tracks and screens can be included. Some deposits require us to use solvents such as acetone.

Anodizing is one of the primary finishes used for architectural aluminum, for its aesthetics and function. We are experts at restoring all architectural metal, with regular maintenance newer aluminum should never need to require expensive restoration.

### **Our process removes the following:**

Pollutants, dirt, oils, tar, paint, cooking oils, and residues from latex paints. Heavy paint removal may cost extra.

### **Stains typically removed (Not guaranteed):**

Rust, concrete, and some color variations

### **Examples of stains we typically cannot remove:**

We cannot remove scratches, only hide them with repainting. Color variations due to anodizing dye lots; severe discolorations or stains caused by acids or strong alkaline, concrete or welding splatter and scratches or dents. Once anodizing becomes scratched or is exposed to years of weathering or is worn off (doors, handles, screen doors etc.), it may be necessary to replace or paint it.



*Dark bronze duranodic aluminum-machine polished with our proprietary four step process removes 40 years of oxidation.*

## **EXPERT GLASS, METAL AND STONE RESTORATION**

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