

CONSIDERING SURFACE FINISH OPTIONS THE IMPORTANCE OF ANODIZATION

Anodization Defined

Anodizing is an electrochemical process that converts the surface of aluminum into a durable, corrosion-resistant finish, which is fully integrated with an underlying aluminum substrate so it cannot chip or peel.

During anodization, an electric current is passed through aluminum that is immersed in an acid electrolyte bath. This process creates highly controlled oxidation—the enhancement of a naturally occurring phenomenon where aluminum oxide forms on exposed surfaces (Aluminum Anodizers Council, AAC).

Benefits of Anodized Aluminum

Durability

- The hard, weather-resistant layer of anodization has a long life span.

Usability

- Cleans easily with mild soap and water restoring the surface to its original appearance.
- The smoother surface has less friction, allowing parts to slide more easily in slots than mill aluminum.

Aesthetics

- Provides a clean, “finished” look while allowing the aluminum to maintain its metallic appearance.
- Even with exposure to UV rays and natural elements, the original color of the anodized part will remain over its lifetime



Examples of different surfaces in rails used for solar module mounting.

Other Considerations

Colored Anodized Aluminum

Anodizing is a highly controlled oxidation where the porous surface oxide layer is “sealed” to complete the process. Sealing is accomplished by submerging the aluminum in warm water which hydrates the oxide and shrinks the pores. Putting dyes in the water during the process allows it to permeate the oxide layer, adding color to the aluminum surface.

Painted Surfaces

While a properly prepared surface can be painted to provide a sleek finish, it will deteriorate over the life of the solar array due to exposure to weather and seasonal heat cycling.

For aluminum, painting is more expensive and less durable than anodization.



Paint peeling on an aluminum surface.

Environmental Impacts

According to the Aluminum Association, about one-third of all aluminum produced in the U.S. is from recycled sources, saving some 95 percent of the energy required to produce aluminum from raw materials.

Under Environmental Protection Agency rules, conventional anodizing generates no hazardous waste; it does not use volatile organic compounds (VOCs) or EPA-listed toxic organics. Heavy metals are dramatically lower than exterior-use paint pigments or plating. Recyclability is unaltered by anodizing and no intermediate processing is needed for anodized metal to re-enter the recycle chain.

Mill Finish and Performance

Aluminum with a mill finish, or bare aluminum, is the natural finish that extrusions have as they emerge from the extruder die. No additional surface preparation is applied.

Aluminum oxidizes over time with a light white powder as it is exposed to air and moisture. Oxidization is accelerated under very moist, acid or salty conditions, generating a pitted surface. While the surface of the natural aluminum changes with exposure, there is no significant structural or mechanical impact to the integrity or performance of the aluminum.



Oxidized aluminum on wheel rim.