

Surface Preparation Guide - Aluminum

Aluminum is a malleable, silvery-white metal with excellent machining properties and corrosion resistance. At roughly one-third the density and stiffness of steel, aluminum is a popular architectural building material that is commonly used to construct components such as window sashes, handrails, piping, flashing, and window frames.

Depending on the type and grade, aluminum alloys can perform well without a coating in non-aggressive environments. Aluminum's excellent corrosion resistance comes from a thin layer of aluminum oxide that forms on the surface of the metal when it is exposed to air.

While the layer of aluminum oxide protects the metal from further corrosion; abrasion and natural erosion can remove this oxide layer, exposing new aluminum to the environment and starting the oxidization process over again.



Although the layer of aluminum oxide can provide sufficient protection in mild exposures, aluminum structures in aggressive environments may require the increased durability of a coating system.

While this layer of oxide provides sufficient protection for most exposure environments, aluminum structures appearing in marine environments can corrode if left unprotected.

A well applied coating system can prevent the substrate from forming the initial layer of aluminum oxide, improving the abrasion resistance and durability of the aluminum in extreme environments.

This guide is based on MPI's Level 2A Architectural Painting course and provides an overview on how to prepare bare aluminum structures in aggressive exposure environments for painting.

1) Remove Surface Contaminants

Surface contaminants, like dirt, oil and grease, must be removed to promote adhesion between the subsequent coatings and the substrate. Additionally, lubricants used to reduce friction during processing or fabrication may also be present on the surface of aluminum components.

Surface contaminants may be removed using an emulsifying cleaner, by solvent washing, or by high pressure water cleaning depending on the extent of contamination. Caution should be taken to ensure that the cleaners used do not contain caustic compounds as this can cause further damage to the aluminum.

2) Remove the Layer of Aluminum Oxide

Once the surface is free of surface contaminants, the next step is to remove the layer of aluminum oxide and to provide a surface profile for the subsequent coatings to adhere to. While there are several ways of accomplishing this (abrasive blast, sanding, power tool abrasion), a popular method is to use an acid etching solution to achieve a suitably prepared aluminum surface.

To prepare the aluminum, apply the etching solution to the substrate and allow the solution to remain on the surface for 5 to 10 minutes before rinsing thoroughly with clean water to remove all traces of the cleaning agent. Once the surface is completely dry, priming or painting should begin immediately to prevent the natural oxide from forming again.



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