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## HERE'S SOMETHING TO RAIL ABOUT

By Bob Cusumano

Over the past few years we have seen an increasing number of coating failures of the factory finishes that were applied to aluminum railings. While this presents potential repaint business for painting contractors, you need to be sure that the job you perform won't also fail.

Before we discuss repainting options, we need to determine why the original coating failed. Part of the problem is that the general public, and unfortunately many specifiers, believe that as long as items are "powder coated", a long lasting finish will be achieved. However, powder coating is an application process, not the designation of a particular coating. Just as a myriad of different paints can be applied as liquid paint, different grades of coatings can be applied by powder coating. The powder used for the process is a mixture of finely ground particles of pigment and resin, which is sprayed onto a surface to be coated. The charged powder particles adhere to the electrically grounded surfaces until heated and fused into a smooth coating in a curing oven.

The American Architectural Manufacturers Association (AAMA) designates three different levels of coating performance including:

Best: 2605-05, 10 years color retention and chalk resistance

Better: 2604-05, 5 years color retention and chalk resistance

Good: 2603-02, 1 year color retention and chalk resistance

AAMA 2603 applies to polyester and acrylic coatings and is intended primarily for interior, light commercial and residential-grade exposures. AAMA 2604 and 2605 apply to coatings that are intended primarily for commercial and architectural-grade applications. AAMA 2604 applies to silicon polyester coatings; AAMA 2605 applies to coatings that contain 70 percent PVFD, commonly called Kynar coatings.

On railings that are located in coastal areas, the common cause of coating failure is corrosion. If an AAMA 2603 coating has been applied which offers a low level of protection, then moisture and chlorides can penetrate through defects and thin areas of the coating, causing the aluminum beneath the coating to corrode. Because the corrosion product occupies more space than the non-corroded aluminum, the coating is lifted and the process is accelerated as more moisture and salt enter and undercut the paint film. Photo 1 shows the early stages of this condition. Photo 2 shows a cross section through an aluminum picket. Notice that the coating is very thin at the corner due to surface tension.



Photo 1

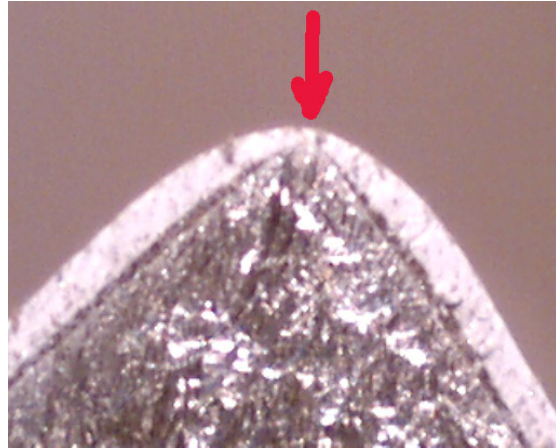


Photo 2

In other instances, corrosion is initiated at breaks in the coating where different pieces of metal are joined. This is shown where pickets penetrate into the bottom rail as in photo 3 and where pieces of handrail join in photo 4. The use of a coating resistant primer can greatly enhance the performance of factory applied coatings.



Photo 3



Photo 4

Even when an AAMA 2605 grade coating is specified and applied, failures may occur. As in repainting, proper surface preparation is of paramount importance when aluminum is factory coated. The prescribed surface preparation includes an acid or alkaline wash to

remove impurities, fresh water rinse, and a chemical conversion coating pretreatment. This is a process that treats the metal surface chemically when the metal is immersed in or sprayed with various solutions. The finish provides good protection and adhesion of the additionally applied coating.

When proper surface preparation has not been performed, then delamination of the coating to bright metal may occur. This condition is shown in photo 5. When corrosion is the cause of delamination, then only affected areas show poor adhesion test results. When improper surface preparation is the cause of the delamination, then non-corroded surfaces exhibit poor adhesion test results.



Photo 5



Photo 6

Now that we've discussed the common modes of coating failure on aluminum railings, let's consider repainting options. The first step is to determine the extent of poorly or marginally adhered paint by performing adhesion tests. If the amount is small and isolated, then hand or power tool cleaning to remove the loose coating followed by sanding to feather edges is appropriate. If the remaining paint is hard and glossy or if the bare aluminum is shiny, then the surface should be abraded to establish good mechanical adhesion. The paint delamination shown in photo 6 is the result of failure to abrade the hard factory applied coating before repainting. If a high percentage of the coating is defective, then abrasive blasting or chemical stripping is warranted.

On those railings located in marine atmospheres, it's important to remove all salt as part of the surface preparation process. If chlorides are painted over, a condition known as osmotic blistering can occur. This phenomenon involves the migration of moisture through the coating film in an attempt to dilute the salt. It's nature's way of trying to keep the universe in balance. When this occurs, blisters develop in the paint. Fresh water alone is not effective in removing all salt deposits. A liquid chloride ridding solution can penetrate into pits and crevices freeing the chloride where it can be flushed away with fresh water. This operation should be done just before painting to avoid recontamination of the surface.

You should consult with your paint supplier for the recommendation of an appropriate paint system to reapply to the railings. In mild environments, Direct to Metal (DTM) acrylics are often used. In more aggressive environments, multi-coat systems of an epoxy primer and catalyzed urethane are employed. Air dry Kynar 70% PVDF coating systems, similar to factory applied coatings, offer “top of the line” gloss and color retention. Though very expensive, extended warranties up to 20 years are commonly offered when three coat systems consisting of an epoxy primer, a Kynar color coat, and a clear Kynar top coat for ultraviolet light protection are applied.

Repainting of aluminum railings can be a lucrative addition to your painting resume. By employing necessary surface prep and applying durable coatings, many years of effective service can be achieved.