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IT PAYS TO BE PREPARED

By Bob Cusumano

One of the leading modes of paint failure is peeling or delamination on exterior surfaces. Regular readers of this column know that I am constantly stressing the importance of performing adhesion tests. In this article, we'll review some of the contaminants and conditions that can result in poor coating adhesion.

In repaint situations, you must determine the soundness of the existing paint coats. As exterior paints weather, a surface chalk often usually develops which can interfere with paint adhesion, especially when the paint that you are applying is a latex. If that surface chalk is heavy, it must be removed. If it is light, then a masonry conditioner whose function is to bind the light chalk to establish a sound surface can be used. Photo 1 shows one of four hundred and fifty houses that was in the process of being painted. About halfway through the project some peeling began to occur. When he pressured cleaned the house the second time, look at all of his paint that was removed (photo 2). The problem was that there was a very thick layer of the chalk that was not removed during surface preparation. Even though a masonry conditioner was applied it could not penetrate through the six mils of chalk on the surface. Unfortunately, this painting contractor went out of business due to this project.



Photo 1



Photo 2

Dirt, mildew, wax, oil, salt, are other surface contaminants that may interfere with the establishment of good coating adhesion and must be removed using appropriate measures. Photo 3 shows a residence with wood siding where the contractor painted over mildew. When this occurs, the mildew continues to grow beneath the paint. The remedy is to strip the paint, kill the mildew, and repaint. It's always cheaper to do it right the first time. Photo 4 shows the result of painting over a door that had been waxed.



Photo 3



Photo 4

Hard, smooth surfaces should be sanded and wiped clean to de-gloss the surface and promote good mechanical adhesion. Photo 5 shows that this is an effective procedure. The shiny plastic laminate coupon on the left was sanded and wiped prior to painting. The coupon on the right was left in its natural state. Adhesion tests on each sample show that sanding and wiping increases the adhesion.

But in repaint situations, not only does the surface being painted need to be evaluated but also the adhesion of the existing coatings. It is common that when additional coats are applied to a previously painted surface that has marginal paint adhesion, the additional weight and stress produced may cause delamination, especially when applying top of the line products. Therefore, it's important to test the adhesion of existing coats to avoid failures like those shown in photo 6.



Photo 5



Photo 6

Now let's address some adhesion issues when painting new exterior surfaces. Rough sawn wood, especially when weathered, has loosely attached wood fibers on the surface. If a latex paint or solid stain is spray applied to this surface, then poor adhesion often results due to the paint laying on the surface and loose fibers detaching from the wood carrying the paint with it. This condition is shown in the adhesion test result in photo 7. When that same wood was painted by brush instead of sprayed (photo 8) the adhesion was improved because the paint was "worked into" the substrate.



Photo 7



Photo 8

Smooth wood siding sometimes has a hard, slick surface finish known as mill glaze. It is believed that mill glaze is a result of the planing process wherein the heat produced causes wood resins to produce a varnish-like substance on the surface. Roughening the surface prior to priming, usually by sanding is advised to promote good adhesion.

There are a few issues to be concerned about when painting new concrete. The surface of new concrete is often very hard and slick. The warehouse shown in photo 9 had to be stripped, acid etched, and repainted because good mechanical paint adhesion was not established.

Laitance is a thin layer on the surface of new concrete that consists of fine particles due to the upward migration of water during the placement and curing process and often occurs on concrete floors. This concrete layer is of low strength and should be removed when surface preparation is performed, preferably by shot blasting. Photo 10 shows what can happen when a concrete floor is not properly prepared.



Photo 9



Photo 10

New concrete retains moisture for a very long period of time. The rule of thumb is to wait 28 days before painting. The purpose of that time frame is to allow the surface, which is initially highly alkaline, to become neutralized due to contact with carbon dioxide in the air. Be aware, however, that even though the surface may have the proper pH for painting, the concrete can still contain excessive moisture. If a "non-breathing" paint is applied, delamination can result. Unfortunately, a patch test is not always effective in predicting poor adhesion resulting from moisture due to the fact that good adhesion may be initially established but as time passes the coating may delaminate as moisture attempts escape out of the coated concrete.

Efflorescence is the formation of crystalline salt deposits, usually white, on a surface due to the migration of water through a cementitious substrate. Both laitance and efflorescence are unsuitable surfaces for painting as long term coating adhesion will be compromised.

Painted stucco or cement plaster can similarly be affected by efflorescence and moisture. With these surfaces, however, another factor to consider is the cohesive strength of the plaster itself. It is not uncommon to have "low strength" or soft stucco as a result of an improper mix or cure. When these surfaces are subsequently painted, the paint adheres to the plaster, but delamination occurs within the plaster itself due to a cohesive failure. This is particularly likely when elastomeric coatings possessing high surface tension and weight are applied.

Most delamination failures can be anticipated by applying patch samples to assess the adhesion of the coatings. Taking the time to perform this important test can be the difference between success and failure of the painting project.