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PITFALLS OF PAINTING STUCCO

By Bob Cusumano

Painting stucco or cement plaster can be a tricky proposition. Although coating manufacturers often have some of their longest material warranties when their paints are applied to these surfaces, don't fall into the trap of believing that you don't need to be careful when coating these surfaces.

Alkaline conditions can be very devastating to many paints. Therefore, it is important to measure the pH of the surface of stucco, or any cementitious material, before you paint it. pH is a measure of the acidity or alkalinity of a substance. A pH of 7 indicates neutrality. pH readings decreasing from 7 indicate increasingly acidic conditions. Likewise, pH readings increasing up from 7 indicate increasingly alkaline conditions. When stucco is first applied, the surface is highly alkaline, usually at a pH of 12 or above. As the curing process proceeds, the surface of the stucco becomes more neutralized and the pH is lowered. The pH of properly cured cementitious products is in the range of 8 to 10. Most manufacturers would recommend that traditional paint products not be applied to surfaces having greater alkalinity.

So how do we measure pH? Well, the most prevalent method is to use a pH pencil and distilled water. These pencils may be obtained from companies that distribute paint testing equipment. The pH on the surface of the stucco is measured by wetting the area with distilled water, stroking the moistened surface with a pH pencil, waiting approximately 30 seconds and then comparing the developed color to the pH chart provided with the pencil (photo 1). pH papers and electronic measuring devices are also available.

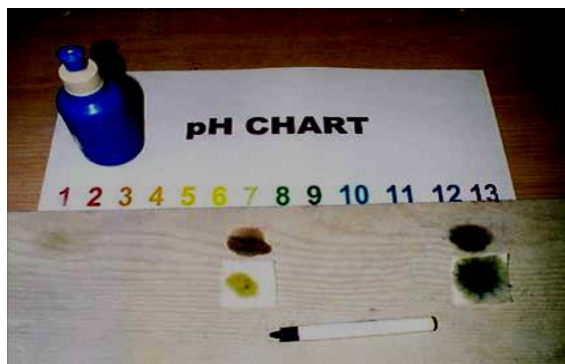


Photo 1

What happens if we paint a stucco that is too alkaline (commonly called “hot”)? Depending upon the properties of the paint used, including the type of resin and pigments employed, the paint may suffer from a condition known as alkali burn. Alkali burn occurs when the resin and or pigments in the paint degrade and "bleach out". The surface will usually have a mottled or blotchy appearance and often premature chalking occurs. This condition is shown in photo 2.



Photo 2

Moisture also plays a role in alkali burn and therefore should also be measured using a moisture meter before painting stucco. You may measure the surface pH of the stucco and find it in a normal range. However, if the stucco still has a high moisture content due to retained moisture and is painted, or if water can enter the painted stucco through cracks, the pH of the stucco immediately behind the paint may increase as alkaline salts migrate toward the surface, but are blocked by the paint film. For this reason when stucco cracks are present, the area immediately adjacent to the cracks is relatively unaffected because the moisture can easily escape through the crack rather than migrate through the stucco thus raising the alkalinity. This is the cause of the spider web appearance.

Two other conditions related to alkalinity and moisture may also occur. Efflorescence is the formation of crystalline salt deposits, usually white, on a surface of the paint due to the migration of water through the cementitious substrate. The vertical rundown pattern obvious in the photo 3 is typical of this condition. When the affected paint film is very permeable, or when voids exist in the coating film, then the occurrence of efflorescence does not cause delamination of the paint.



Photo 3

Saponification is the chemical degradation of a coating due to high alkalinity and moisture and occurs when the resin of the paint used is not alkali resistant. The coating resin is attacked from the rear side and loses its physical characteristics by turning into a soap-like material. Blisters usually occur which have a “mushy” consistency. When the saponified coating dries, it becomes brittle and loses its adhesion. This phenomenon is shown in photo 4.

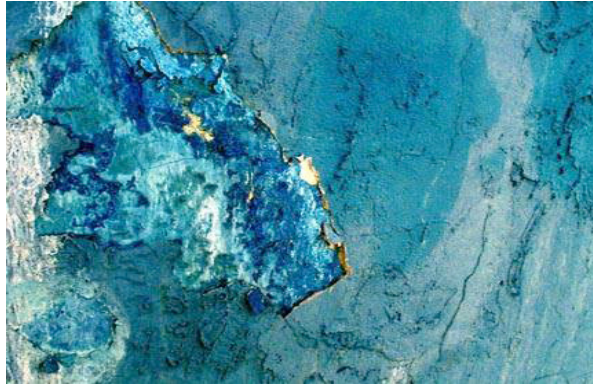


Photo 4

Just checking the surface alkalinity and moisture content of the stucco is not enough. Recently, a painting contract was painting the exterior stucco on a twenty story hotel. A high build acrylic paint was being used. Before painting, the paint manufacturer measured the surface pH of the stucco and found it to be approximately 9 at all locations. The painting contractor measured the moisture content with a moisture meter and found it to be very low, so he proceeded to paint the exterior walls. Within a few weeks, certain parts of the wall began to exhibit peeling paint. Those of you who are regular readers of this column know that I stress the importance of adhesion tests ad nauseum. Well, here's another example of why I do. Adhesion tests should yield results similar to that shown in photo 5. Unfortunately, more than half of the adhesion tests performed on this building had results similar to those depicted in photo 6. Note that there is a thin layer of stucco attached to the rear of the delaminated paint. In this instance, an unstable stucco substrate is the cause of the coating delamination. Even though the surface pH and moisture content of the stucco were proper, the surface in many places was soft and friable rather than hard. When high build products are applied, the weight and stress created may exceed the cohesive strength of the material to which they are applied. When this occurs, the unfortunate result is peeling paint.



Photo 5



Photo 6

Remember, even when you are painting substrates that are considered to be relatively stable, like stucco, there are many physical factors that must be considered. Resin type, pigment types, surface alkalinity, substrate moisture, and stability of the substrate must all be evaluated so that the resultant paint job is both aesthetically pleasing and long lasting.