

SELECTFLEX TECHNICAL APPLICATION BULLETIN

The combination of high lime stucco, schedule and cost pressures, very hot and dry conditions, and failure to appreciate the importance of stucco hydration and curing prior to coating with Selectflex™ may lead to stucco cracks, white blooms of efflorescence salts in some areas of the stuccoed surface, and early coatings failure - sometimes in less than a year after coating.

Coating Selectflex™ over stucco that is inadequately cured (high pH) or still wet (high moisture) can lead to a saponification failure, especially at locations where subsequent leaks or water wet the stucco substrate.

Saponification of Selectflex™ - adhesion loss on coated stucco: saponification at the contact point of Selectflex™ on a stucco surface: saponification refers to a process also called alkaline hydrolysis: water and high alkalinity breaks an ester [a class of organic compounds that react with water to produce an alcohol and an acid] down to a carboxylic acid [an organic acid -COOH or -CO₂H, typically a weak acid] and an alcohol. If the pH of the stucco surface continues at an alkaline level, which often happens when raw stucco is coated-over too soon, carboxylic acid will be detected as carboxylic acid salt - (a carboxylate anion with metal cation, such as Na or Ca). Saponification weakens the coating's adhesion at the surface of the stucco.

Water or wet stucco combined with high pH is what creates a saponification-adhesion-loss problem on stucco and can also cause hairline cracks in the stucco coating. Here is a more technically detailed explanation of the stucco saponification adhesion failure problem.

Saponification not only affects coating adhesion. the acrylic film [Selectflex™] becomes rigid, possibly leading to hairline cracks in the stucco coating. Exposure to the alkaline solution from the stucco forms a hydrophilic [water resistant] layer of low molecular weight calcium soap beneath the [Selectflex™] film that attracts additional water and causes the saponification to spread. Ultimately, the chemical "anchor" [holding the Selectflex™ onto the stucco surface] is removed from the film which results in diminished adhesion. A coatings saponification failure mechanism can be further supported by the location of the failures on the building. Look for specific locations of coating adhesion failure, contrasted with a more uniform coating adhesion failure over all of the structure, on all sides and locations.

In a saponification failure of a coated stucco surface, most of the surface area sealed by the coating and not exposed to water will be found soundly adhered with no signs of deterioration.

Water permeation of the stucco substrate at ledges, mortar joints, edges of balconies, cracks, and areas near the ground which were wetted by capillary action, cause the alkaline salts in the stucco to be leached into the water, resulting in a stucco coating saponification failure.

Stucco pH as Contributor to Coating Failure

When coating stucco with Selectflex™ or any acrylic based paint or coating, the pH (alkalinity) of the surface as well as moisture trapped under paint have been associated with efflorescence or white blooming problems.

Field test of stucco pH: A simple field test can measure the alkalinity of the stucco: A small sample of the stucco is removed from the building, powdered and added to an equal volume of *distilled* water. Do not use tap water. If the measured electrical resistance in the solution is low and if the chloride concentration is high there is a considerable level of chloride-based electrolyte in the sample. Measure the pH of the sample. If it is high (pH was 11) the stucco sample is very alkaline - a neutral pH is 6-7 range.

White powdery blotches appearing in the coated stucco surface are usually blooms of efflorescence caused by coating cracks or other areas of extra moisture absorption in the stucco surface. Where recently-applied stucco was not adequately cured, and where surface alkalinity remained too high (pH over 11) white efflorescence blooms are particularly common. This coating error, sometimes the fault of rushing the application job, leads to both cosmetic defects and early coating failure.

While a stucco applicator reports having taken *some* pH measurements with acceptable results, our field work has consistently found that both moisture and pH vary significantly over a building surface. When relying on measurements (and thus rushing the Selectflex™ job schedule or applying “early”) rather than allowing more elapsed time in deciding when to coat a building, a common error is to rely on “safe” readings obtained in some areas while failing to measure or attend unacceptable moisture or pH level readings in other building areas.

If on a building the stucco was applied in very hot dry conditions (no surprise in Arizona) and if the stucco was inadequately wet down (hydrated) during cure, that could also have left areas of high pH, making the pH measurements we cited above critical when deciding when to apply Selectflex™ or whether additional surface preparation was needed.

Tips for Avoiding Coatings Failures on New Stucco Exteriors

- **Hydrate the stucco:** Be sure that the stucco is adequately hydrated during curing. Washing down the stucco in hot dry climates and keeping it hydrated avoids cracking and the development of white efflorescence blooms on the building surface. Typically in hot or windy conditions the new stucco is hydrated by the stucco contractor for two or three days to slow the stucco curing rate and to permit the chemistry of stucco curing to complete to a sufficiently hard and impermeable surface.
- **Be sure that the stucco has adequately cured** before coating with Selectflex™. Typically the stucco must cure for at least ten days to two weeks before it can be coated. The pH of cured stucco is normally below 11. If the stucco is still "hot" - not cured - it risks early coating failure.
- **Fill cracks and holes** found in new stucco using an elastomeric stucco patch compound before coating [Selectflex Base™], and be sure that the patches have also cured according to Complete Coatings® recommendations.
- **Make proper moisture & pH measurements** of the stucco before applying Selectflex™. High pH (over 11) stucco is likely to give a problem for the new coating job. When measuring pH on a wall, don't just measure the obviously "ok" areas, measure where you see fine cracking, early signs of efflorescence, areas of paint failure in a primer coat, and in representative sun-exposed and shady wall areas. Different exposures of a building's stucco exterior may cure at different rates because of variations in sunlight and wind. Follow the pH and moisture test and level recommendations of Complete Coatings®.
- **Use a water based masonry primer or sealer [Complete Coatings Premium Primer & Sealer™]** as the first coat. This helps avoid trapping moisture in the new stucco wall. Be sure that the primer is one that Complete Coatings® recommends for this application, and that it is applied at the thickness (rate of coverage) recommended by Complete Coatings®. Don't over-thin the paint in the can nor on the surface.
- **Be sure that the primer coat is thoroughly dry** before applying a second coat.