Diagnosing and Mitigating New Pool Plaster Problems

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Identifying Chemical Effects on New Pool Plaster

Before filling a new plaster pool, the chemistry of the fill water should be determined. Water that is too soft can create plaster dust, and etch or weaken the new plaster surface. We have documented this with our own studies and experiments. Water containing excessive heavy metals such as iron and copper can stain the surface.

Staining – As mentioned, fill water containing excessive levels of iron, copper, or other staining agents should be removed or at least treated before the pool is filled, or, if that is not possible, immediately upon filling the pool to the surface tile level. This kind of staining can usually be removed by acid washing, sanding or chelation, some of these techniques are invasive to the surface, and avoiding staining is better than removing it later.

Stains or Etching from Improper Chemical Addition – Pool chemicals need to be added to the water in a manner that prevents aggressive amounts of chemical or imbalanced water from affecting the new plaster surface. Acid should always be pre-diluted before adding, salt should only be added after 30 days of plastering, and should not be allowed to sit as a solid on fresh plaster, and cyanuric acid must also not sit as a solid on new plaster.

Water Balance, Scaling and Etching – Of course, once the pool is filled, APSP water chemistry parameters and the Saturation Index provide excellent guides for maintaining pool water in a manner which will minimize detrimental effects to the new plaster surface. The recommended LSI parameters of -0.3 to +0.5 is the acceptable limit.

Etching (from low pH/alkalinity/hardness) and scaling (from high pH) are uniform effects across the pool surface, unless affected by areas of greater or lesser pool plaster surface porosity.

Although stains and scale deposits can generally be removed by sanding, acid washing or chelation, etching is permanent and can only be moderately mitigated by sanding the surface.

Acid Start-ups – Swimming pools should never undergo the acid start-up process. Designed as a way to remove plaster dust without filtration, acid start-ups are too aggressive for fresh plaster. As mentioned above, properly plastered pools with (if necessary, appropriately compounded) fill water do not generate plaster dust, and subjecting fresh plaster to water with a pH below 5 is not an appropriate substitute for doing things right in the first place.

Identifying Curing Effects on New Pool Plaster

Newly plastered pools must be filled at the right time, and any water exposure must be even and uniform. Filling a pool too early results in a weakened and deteriorated paste surface, especially in the bowl of the pool where the effect is worse because it may be exposed to fill water mere minutes after final troweling. The optimum fill delay (time between final troweling and filling the pool) is on the order of six or more hours, give or take a little for environmental conditions. This fill delay is often realized for the upper half of the pool, which may not be submerged for a day or longer depending on water pressure, while some plastering crews start the fill before they leave and thus compromise the lower half of the pool surface.

Wetting of parts of the surface by rinsing down the deck, rinsing off pool steps or areas where debris falls, etc. must also be avoided, since the uneven exposure of fresh plaster to water makes permanent discoloration. The fill must also be continual – pauses in the fill may result in "bathtub ring" permanent stains.

Identifying Plastering Defects on New Pool Plaster

Delaminations – This is the separation of the new layer of plaster from its underlying substrate, whether that is old plaster, gunite or shotcrete, etc. Delamination and the associated phenomenon known as "popoffs" are usually caused by improper surface preparation to create a good bond with the new material. Delaminated areas may be patched if small, but larger delamination problems require replastering.

Calcium Nodules – Nodules are a form of efflorescence, or the migration of calcium salts from the plaster interior to the surface. As the calcium carbonates at surface, nodes form which may be circular volcano-type formations or stalactite-like drips down the plaster wall. They are most often associated with delamination or with severe craze cracks, either of which allow water to penetrate the surface and dissolve and bring calcium from the interior to the exterior of the pool plaster layer. Nodules may be removed by sanding or scraping, but may recur if the delamination void or the craze network is not yet fully carbonated.

Spalling – Spalling is the flaking or peeling of thin layers of plaster at the surface. It is usually caused by late troweling or the over-troweling of the surface when the underlying paste is wet but the surface cement laitance is dry. It can also be caused by adding too much water while troweling. This usually results from improperly timed trowel passes, or from hot, windy or dry days. When water evaporates from the surface faster than mix water bleeding up can replace it, and then when that surface dry crust is troweled, a weakened subsurface zone is created that will be prone to spall. Spalling may occur immediately, or even years later, from surface impacts, stress from suction cleaners, etc. Spalls may be sanded, although if a large percentage of a newer pool is spalled the pool may need to be replastered.

Craze Cracks – Crazing is an excessive amount of surface shrinkage cracking, which can result from excessive drying of the plaster before the pool is filled, from an overly-wet plaster mix, from the adding of excessive water while troweling, or from excessive calcium chloride set accelerator added to the batch. Crazing often leads to other problems including calcium nodules, staining, and provide a home to black algae. Excessive crazing may require replastering.

Discolorations – New pool plaster can discolor (darken) from excessive calcium chloride set accelerator, from improperly timed troweling (which can seal the surface dry while moisture is entrapped below), from thin and thick areas due to an uneven shell, from adding water to the hardened surface during troweling, etc. Gray (or grey) mottled discoloration (also incorrectly known as a "hydration problem") is difficult to remove, may be remedied by acid washing, sanding, or torching the surface, but these processes are generally detrimental to a plaster finish. Late hard troweling can cause what is known as "trowel burn" which darkens the plaster color in localized areas. Sanding can remove this discoloration. Mottled color variation from calcium chloride or other sources may not be removable.

Spotting and Streaking Deteriorations– Plaster may have soft (porous) spots and streaks resulting from the addition of water to the hardened surface during late hard troweling in plaster containing excessive calcium chloride. This late hard troweling disturbs surface aggregate, and added water penetrates around that aggregate and the spreads laterally through the porous paste caused by acceleration shrinkage. Beginning as excess porosity around the disturbed aggregate, soft spots expand and sometimes coalesce into larger affected areas. Disturbed zones along accent or surface tile, around fittings, etc. may also display this non-removable deterioration.

Whitened Discoloration of Colored Plaster – Integrally colored pool plaster may show whitening either uniformly or in patterns. Uniform discoloration may be caused by using incompatible admixtures: specifically color and calcium chloride. These colored plasters may also be discolored (white streaking) from the addition of water to the surface or to tools applied to the surface during finishing. These discolorations are permanent.

Plaster Dust – This is the bleeding (loss) of calcium from a weak and porous plaster surface and/or as a result of filling with too soft water. This dust can in turn harden into a surface calcification and trap dirt or metals, creating further discoloration. Dusting from new pool plaster is preventable by properly compounding and finishing the surface, and then ensuring the chemistry of the fill water is appropriate. When necessary, the fill water chemistry should be adjusted by adding sodium bicarbonate, acid, chelating or sequestering agents, etc. through a slurry tank as the pool fills. Although plaster dust can be removed by chemically balancing the water and then brushing and filtering, the damage from the calcium loss from the surface is permanent. We have documented this with our own studies.

Prevention is the key – proper plastering procedures, proper curing, and proper water balance result in a plaster surface that is both maintainable and aesthetically pleasing. Fixing errors after-the-fact is generally less than desirable, and some detrimental effects can only be remedied by replacing the plaster.