NATIONAL PLASTERERS COUNCIL

Avoiding Soft Water or Water with a Low Calcium Hardness

Filling a pool with 'soft water', or water with low calcium hardness, should be avoided. It is recommended that fill water should be above 200 ppm calcium hardness (above 150 ppm calcium hardness for some high-performance finishes). Filling a pool with soft water will cause damage to the cementitious finish. The resulting damage can range from severe discoloration to a weakened cement binder and a reduced service life.

In nature, almost everything is moving towards equilibrium or balance. If water that is deficient in calcium is in contact with a material source of calcium, it can dissolve or leach calcium from the material. This can occur with a cementitious material in contact with soft water or water with a low calcium hardness. As cement chemically reacts with water (hydration reaction) to form compounds that create a hard and durable binder matrix, there is a simultaneous reaction that forms a biproduct compound (calcium hydroxide) that is released within the binder matrix. This compound is not part of the durability and strength of the cement binder matrix and is considered the 'weak link' as it is generally the first compound to be attacked or compromised.

During the initial stage of the curing process, the hydration reaction releases a large amount of calcium hydroxide into the matrix. It migrates into the voids and spaces within the cement binder matrix and super-saturates the matrix. It is this excess of calcium hydroxide (known in the trade as 'plaster dust') that is released out of the matrix in the presence of moisture. If a cementitious product is allowed to dry, as with concrete, this calcium hydroxide that has exited the matrix, can form as white efflorescence on the surface. The loss of this excess calcium hydroxide is not harmful. In fact, it is a common occurrence. Newly placed cementitious materials that are in a constant water-contact environment (like a pool interior finish) release a significant amount of calcium hydroxide. This occurs due to an excess (super-saturated) amount of calcium hydroxide within the cement binder matrix. This excess amount of calcium hydroxide migrates and diffuses into the water. This is not deleterious to the interior finish.

However, if soft water or water with a low calcium hardness is in contact with the finish early on, as when filling the pool after a new finish has been installed, the water can leach calcium hydroxide from the upper surface of the finish, beyond that which is in excess. This can damage or weaken the cement binder at the surface.

Optional Remedies or Considerations

1. Soft water, or reverse osmosis water, can often be turned off or bi-passed, allowing the tap water or municipal water with a sufficient calcium hardness to fill the pool.

2. Using alternative sources of water, such as water from a fire hydrant, or using trucked-in water.

3. Dosing the water with a form of calcium (most often calcium chloride) as the pool fills, to increase the calcium in the fill water to acceptable levels.

4. If soft water or water with a low calcium hardness cannot be avoided, it is recommended to seal the surface with a polymeric material that is designed to seal, harden, or densify the surface. Then once the pool is full, immediately balance the water chemistry, including raising the calcium hardness to appropriate levels.

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