



TECHNICAL BULLETIN CP-30

EFFLORESCENCE CAUSES, PREVENTION, AND REMOVAL

WHAT IS EFFLORESCENCE?

Efflorescence occurs when water migrating through concrete or masonry picks up free salts and other soluble materials and deposits them on the surface. These deposits react with the atmosphere, producing an insoluble product that is typically white in appearance. Primary efflorescence results from the bleed water rising to the surface during concrete placement, and secondary efflorescence is caused primarily by water that travels through the concrete after rain, from irrigation, or the surrounding soils, etc. Efflorescence can be accelerated by low temperatures, moist conditions, condensation, dew, and water added to the surface of fresh concrete to assist in troweling. It can occur very soon after exposure to these conditions but sometimes appears gradually over time.



Efflorescence Close-Up



Efflorescence on Colored Concrete

While almost every slab of concrete has some form of efflorescence, it becomes much more noticeable in integrally colored slabs where higher prices are paid for a decorative look and expectations are greater.

Any material containing portland cement can experience efflorescence. The most usual reaction occurs when calcium hydroxide (lime) formed in the hydration reaction of portland cement is transported by water to the surface through capillaries in the concrete. There it combines with carbon dioxide from the air to produce calcium carbonate (the insoluble material) and water. But efflorescence can also be caused by hydroxides and sulfates of either sodium or potassium, which are much more soluble in water than calcium. And they form efflorescence more rapidly than calcium hydroxide. These salts can come from cement, aggregates, water, or admixtures.

Efflorescence is normally white and shows up more on darker-colored concrete or masonry than white or light gray because of the contrast. Only 0.2 ounces of calcium carbonate per square yard of surface is needed to cause a significant shift in color. Some forms of efflorescence are very difficult, if not impossible, to remove, while others are easy—especially if the efflorescence is removed right after it forms.



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MINIMIZING AND REMOVING EFFLORESCENCE

To minimize efflorescence, we can reduce some of the ingredients necessary for its formation. Using water-reducing admixtures results in less bleed water. Increasing the pozzolans or silica fume reduces the Portland Cement which results in less calcium hydroxide. Diverting moisture away from the slab helps as well. Adding integral waterproofing or weatherproofing admixtures and sealing the concrete will help minimize efflorescence as well.

The easiest time to remove efflorescence is early after concrete placement before the salts combine with atmospheric carbon dioxide to produce insoluble deposits. Up to this time, the soluble salts will dissolve in water, so pressure washing or wet scrubbing will enable the deposits to be rinsed away. You must be careful to rinse the surface with fresh water so that no residue is left to dry on the concrete. Use an air jet or a wet vacuum to remove any standing water. Any remaining solution can cause new efflorescence to appear.



Efflorescence Removal Process with INCRETE JET PHOS

To remove established efflorescence, wet the slab down and apply INCRETE JET PHOS by Euclid Chemical and scrub with a deck brush. Rinse thoroughly with water, or better yet, use a pressure washer. Muriatic acid diluted by 10 or 12 to one with water can also be used, but extreme caution must be exercised to not damage the surface. A small test area is recommended.

Once dry, a penetrating sealer, such as Euclid Chemical BARACADE WB 244, should be applied to slow moisture migration and reduce the occurrence of dissolved salts rising to the surface.