DEICERS AND EFFLORESCENCE – WHAT YOU MIGHT LIKE TO KNOW

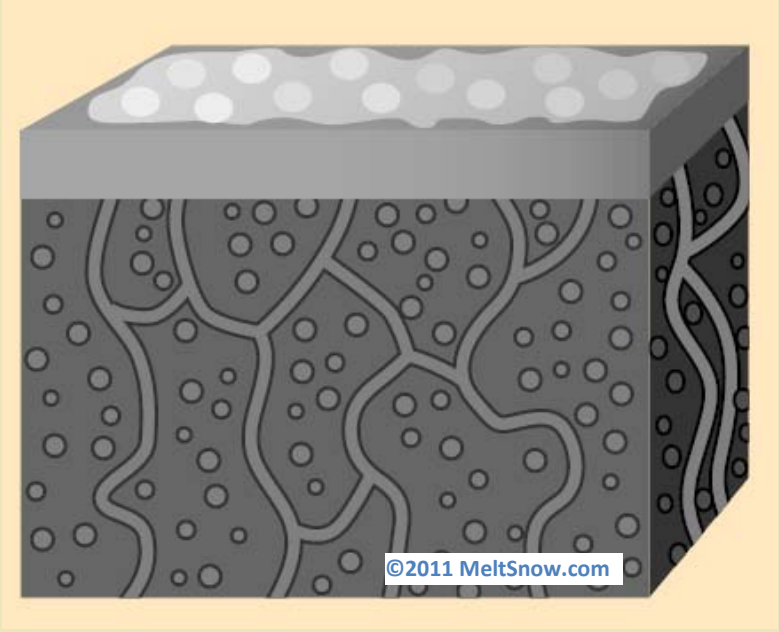
Concrete, Brick and Paver Efflorescence

In snow country, we utilize many landscape features that might be impacted by the use of chemical deicers. Understanding how chemical deicers can cause efflorescence in concrete, brick and pavers is an important first step to managing complaints about this topic.

The Chemistry of Efflorescence

All concrete products contain cement which produces lime or water soluble calcium oxide. Lime can also be in the bedding sand, aggregate base materials, or soil. Although concrete pavers are solid, strong, and very dense, they contain millions of microscopic capillaries that run from the interior to the surface. Moisture from rain, sprinkler systems , underground sources, poor site drainage, or dew enters these microscopic capillaries.

Efflorescence emerges from pores within a magnified area of a concrete. The calcium has been carried to the surface by water and now exposes it to carbon dioxide in the atmosphere which reacts to form the carbonate bloom.



Calcium oxide inside the concrete reacts with the water in the capillaries and forms calcium hydroxide. This rises to the surface, reacts with the carbon dioxide in the air, and forms a white haze of calcium carbonate. When moisture on the surface evaporates, the efflorescence becomes visible.

Efflorescence occurs when free calcium, sodium, and other reactive metal ions absorb carbon dioxide from the air to form carbonates; an efflorescent bloom that looks like wispy white frost. This can happen naturally in new or old concrete and pavers, and in concrete, clay fired brick, and, concrete pavers where deicers are applied. The metal ion component of deicers, such as the sodium in rock salt, or the calcium in calcium chloride, become free after applied and absorb CO2 from the air to form

carbonate blooms or efflorescence; a white frosty crystal growth on the concrete sidewalk, brick paver surface, or clay brick buildings near the areas where deicers were applied.

Certain deicers are far less susceptible to forming carbonate blooms, such as magnesium chloride, and conversely some deicers are more prone to contribute to efflorescence such as calcium chloride and rock salt or sodium chloride.

My decorative bricks all have a chalky white efflorescent bloom on them that keeps growing even after I wash it off. When will this stop?

First you need to determine if the bricks are cement paver type or clay fired type. This is to help anticipate the source of the free metal ion that is causing the carbonate bloom. Most efflorescence stops in early summer following repeated rainfalls which wash it away. Acid rain actually helps in this context because it will dissolve the calcium or sodium bloom upon contact in most cases.

If the source of the efflorescence is coming from free sodium and/or calcium that is residue from winter deicing operations, then it shouldn't last very long. If on the other hand it's coming from the concrete itself and is not deicer derived, then it might continue for years or longer.

How to minimize the chance for efflorescence:

Some deicers, such as our MAG products, cannot effloresce and for this reason they specified by many manufacturers of pavers and brick such as Glen-Gery Brick and Unilock. While efflorescence is a natural occurrence, there are some steps that you can take to try to minimize the opportunity for it to occur. One of these steps, applying a good quality concrete sealer, can also reduce the chances of concrete spalling damage which is discussed at length in another technical article on our website at www.MeltSnow.com.