EFFLORESENCE

TECHNICAL BULLETIN #33

Efflorescence is a crystalline material, usually white, that forms on the surface of masonry walls and concrete products. Efflorescence is unsightly and it is usually a source of disagreement among producers, contractors and architects as to why it occurs and what should be done about. While all masonry and concrete materials are susceptible to efflorescence, it is not detrimental to the structural integrity of the material. Furthermore, according to ASTM C1364, Standard Specification for Architectural Cast Stone, efflorescence by itself does not constitute a cause for product rejection.

As cement hydrates water soluble calcium hydroxide is formed. When moisture combines with calcium hydroxide, the likelihood of efflorescence occurring on the surface increases. As the calcium hydroxide solution it is exposed to the elements, it reacts with the carbon dioxide and forms an insoluble compound called calcium carbonate, which is less water soluble. It is difficult to predict whether efflorescence will occur, but when it does, the sooner it is removed the better.

Efflorescence that occurs on the surface of the installed materials is typically due to:

- Improper use of through-wall flashing
- Lack of sufficient or improperly spaced weep holes
- Use of cast stone without a ventilated wythe
- Use of cast stone below grade or at planter type areas without proper moisture barrier (see below)
- Use of mortar joints when sealant joints should be used
- Failure of joint sealants which allow water entry
- Leaving joints open or wall uncovered during construction

There are several reasons why efflorescence occurs, but careful selection of building materials and the design and installation of the materials can significantly reduce its potential.

Planter, fountain and swimming pool coping, treads, risers, stone pieces and pavers may be treated with a silane or silane/siloxane water repellent coating on the surfaces that are above grade. For below grade applications, a dampproofing product, such as a cementitious waterproof stone backing or bituminous dampproofing may be applied to the back, sides and the below grade face surfaces. This will minimize the likelihood of dirt and groundwater entering the surface of the stone; a frequent cause of staining, efflorescence and enhancement of crazing. Check that the water repellent coating does not affect color or texture when dry. Finally, soffit stones are also susceptible to efflorescence from masonry walls above and should be designed to prevent them from becoming the “gutter” of the wall.

Efflorescence commonly occurs in the fall and winter months when the vapor transmission slows down and the masonry stays damp for extended periods of time. Calcium hydroxide is more soluble in water at cold temperatures than at warmer temperatures. This is another reason why efflorescence is more common in the winter than the summer. While most efflorescence is temporary and may wash off with rain water, it is also prudent to remove it prior to it converting to calcium carbonate. For new building construction it is recommended that a cleaning procedure be performed to remove any debris and efflorescence. Care should be taken to use the appropriate cleaning agent and method as further efflorescence could occur.