

EFFLORESCENCE

Efflorescence is a crystalline deposit, usually white, on the surface of masonry walls and concrete products. All masonry and concrete materials are susceptible to efflorescence. It is due to moisture entering through the walls or the surface of the Cast Stone, combining with the calcium hydroxide in the cement, and bringing the hydroxide to the surface in a solution which forms a more insoluble compound when it combines with the carbon dioxide in the air. Efflorescence has no structural or durability significance and does not by itself constitute a cause for rejection according to ASTM C 1364, Standard Specification for Architectural Cast Stone.

Efflorescence is unsightly and is usually a source of disagreement between builders and architects as to why it occurs and what should be done about it when it appears. It is not always possible to predict whether masonry will effloresce. Soluble salts and moisture must be present for efflorescence to occur. These salts may be present in the concrete, mortar, brick or Cast Stone. They may be carried into the wall with rainwater or absorbed by groundwater. Planter areas and water table sections must be properly damp proofed (see section on damp proofing) to prevent wicking of groundwater. Improper ground storage is a common cause of salt contamination. There is some evidence, which suggests that salts can be interjected with admixtures, deicers or with masonry cleaners. While acids are frequently used to remove efflorescence, they can contain chlorides, which contribute to efflorescence. This is one reason why many buildings show signs of efflorescence shortly after wash down.

ASTM C 67 - Standard Test Methods of Sampling and Testing Brick and Structural Clay Tile, includes a wick test for ascertaining whether a brick is liable to cause efflorescence. Small specimens or cubes either molded or saw cut from Cast Stone may be evaluated by this test.

Common installation problems which can cause or enhance efflorescence include the improper use of through-wall flashing, lack of sufficient weep holes, use of Cast Stone without ventilated wythe, use of Cast Stone below grade or at planter type areas without proper moisture barrier, failure of joint materials which allow water entry and the use of hard mortar joints where sealant joints should be used. Soffit stones are particularly susceptible to efflorescence from masonry walls above and should be designed to prevent them from becoming the “gutter” of the wall.

Most efflorescence is temporary and, as such, should be left alone. It most commonly occurs shortly after building wash down and in the fall and winter months when vapor transmission slows down and masonry stays damp for extended periods of time. Calcium hydroxide is much more soluble in water at cold temperatures than at warmer temperatures this is another reason why efflorescence is more common in the winter than in the summer. Acid rain is a natural remover of efflorescence since most salts are highly soluble in water. Leaving of joints open during winter construction is a major cause of calcium hydroxide deposits showing up on brickwork in the spring.

If necessary environmental considerations are taken, a dilute solution of muriatic acid (5-10%) will remove common efflorescence as well as any carbonate of lime which may be present. Manual washing can often draw additional salts to the surface and repeat washing may be necessary, but when all of the salts have come to the surface naturally and been washed off there will be no more trouble from this cause.

For more information and a detailed discussion of efflorescence please go to:

<http://www.cement.org/bookstore/profile.asp?store=&pagenum=&pos=0&catID=&id=246>

This Technical Bulletin addresses generally accepted practices, methods and general details for the use of Architectural Cast Stone. This document is designed *only as a guide* and is *not* intended for any specific application or project. It is the responsibility of design and construction professionals to determine the applicability and appropriate application of any detail to a specific project based on professional judgment, specific project conditions, manufacturer's recommendations and solid understanding of product characteristics. The Cast Stone Institute makes no express or implied warranty or guarantee of the techniques or construction methods identified herein. Technical references shall be made to the edition of the International Building Codes for the location of the structure, the latest edition of the TMS 402/406 Masonry Standards document and TMS 404, 504, 604 Standards for Design, Fabrication and Installation of Architectural Cast Stone.

The Cast Stone Institute (CSI) is a not-for-profit organization created to advance the design, manufacture and use of Architectural Cast Stone. To further this goal, the CSI continually disseminates information to targeted construction industry audiences through presentations, programs and technical publications.