



Standard Guide for Reduction of Efflorescence Potential in New Masonry Walls¹

This standard is issued under the fixed designation C 1400; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers methods for reducing efflorescence potential in new masonry walls.

1.2 The values stated in inch-pound units are to be regarded as the standard. The SI units given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

C 43 Terminology of Structural Clay Products²

C 67 Test Method for Sampling and Testing Brick and Structural Clay Tile²

C 270 Specification for Mortar for Unit Masonry²

C 1180 Terminology of Mortar and Grout for Unit Masonry²

C 1209 Terminology of Concrete Masonry Units and Related Units²

C 1232 Terminology of Masonry²

3. Terminology

3.1 Definitions:

3.1.1 Terminology defined in Terminologies C 43, C 1180, C 1209, and C 1232 shall apply in this guide.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *cryptoflorescence, n*—a crystalline deposit of water soluble compounds in the pores of masonry

3.2.2 *efflorescence, n*—a crystalline deposit, usually white, of water soluble compounds on the surface of masonry.

3.2.2.1 *Discussion*—The color of stains produced by water soluble vanadium compounds in clay masonry is usually yellow or green. The color of stains produced by acid soluble manganese compounds is usually brown or gray.

4. Significance and Use

4.1 This guide provides information that, if implemented, will reduce efflorescence potential in new masonry walls. However, its implementation will not always completely prevent efflorescence.

4.2 This guide may be augmented by related information contained in Specification C 270's appendix, the additional material listed at the end of this specification, and other publications.

5. Principles of Efflorescence

5.1 Efflorescence is directly related to the quantity of salts within, or exposed to, the wall; and to the quantity of water exposed to these salts. Since neither water nor salts can be completely eliminated from an exterior masonry wall, the potential for efflorescence is reduced by reducing salts and water within the wall.

5.2 While water penetration is reduced through proper design and construction, water can penetrate into masonry walls through cracks and separations in the surface and the top of the wall. It can penetrate voids in the mortar joints or the interface between the unit and mortar, and, to a lesser degree through the masonry units and the hardened mortar.

5.3 If a significant amount of water penetrates the wall, the water will dissolve water-soluble compounds that may exist in the masonry units, mortar components, grout, admixtures or other secondary sources, and may deposit them on the exterior surface of the masonry when it migrates to the wall surface through evaporation. Deposits may also form within the masonry resulting in cryptoflorescence.

5.4 The most common efflorescence deposits contain two or more of the following: potassium, sodium, calcium, sulfates, carbonates, bicarbonates, chlorides, and hydroxides.

5.5 Some water-soluble compounds deposited on the surface of masonry can chemically react to form compounds that are not water soluble. Calcium carbonate (CaCO₃) deposits on masonry are a fairly common example. They are a result of reaction between the efflorescence compound calcium hydroxide and carbon dioxide after the calcium hydroxide is deposited on the surface of the masonry and is exposed to the air.

5.6 Under some circumstances, particularly when exterior coatings are present, efflorescence compounds can be deposited below the surface of the masonry units. This condition is called cryptoflorescence. When cryptoflorescence occurs, the

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² Annual Book of ASTM Standards, Vol 04.05.