



FACTORS AFFECTING EFFLORESCENCE

WHAT IS EFFLORESCENCE? WHAT DOES IT LOOK LIKE?

Efflorescence is a deposit of mineral salts, usually white in colour, that may develop on the surface of masonry, concrete or plaster construction. It is frequently seen after a structure has just been completed. The appearance is unattractive and looks like a white splotchy formation on the surface. Although generally harmless, efflorescence deposits can occur within the surface pores of the material, causing expansion that may disrupt the surface.

HOW DOES EFFLORESCENCE OCCUR?

Efflorescence occurs when salts are dissolved in moisture within the mass of concrete, plaster or masonry. The water serves as a vehicle or carrying agent of the salt. As the water moves to the surface of the wall, the fluid carries the dissolved salts to the surface. At the surface, the water evaporates into the air leaving the salt as a deposit, sometimes as small crystals, or possibly as a glazed area. Continued exposure of the deposit may result in alteration to form a more insoluble state.

WHAT IS THE SOURCE OF EFFLORESCENCE IN PLASTER WALLS?

All materials, such as the water, cement, sand and lime, which are used in making a plaster mix, carry some water-soluble salts. Rain water carries dissolved sulphates from the air into the concrete or plaster. Pigments may also contribute to efflorescence in plaster, masonry or concrete. Calcium chloride or any private label compound that contains calcium chloride may be expected to result in the formation of efflorescence. Constant wetting of walls by a lawn sprinkler resulting in a continued wetting and drying cycle may bring salts to the surface resulting in an objectionable appearance.

WHEN DOES IT START?

Efflorescence does not start until there is significant movement of water within the wall to the surface. Because of the influence of temperature change, relative humidity of the surrounding air, air movement and exposure to sun or shade, there is no specific time for a bloom to appear.

WHERE IS IT MOST COMMONLY FOUND? WHY?

The white powder or glazing is found most frequently on the northern and eastern elevations rather than on the southern and western sides of most effected buildings. This is because these walls are generally colder and retain moisture longer than the south or west elevations.

WHAT FACTORS CONTRIBUTE TO THE DEVELOPMENT OF EFFLORESCENCE?

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Low temperature, rainy weather and sustained fog. Lower temperatures affect the formation of efflorescence by retarding or slowing the hydration of the cement while the plaster contains a relatively high moisture content without chemical “locking” of the salts in the final form of the mix. Any factor that will retard the set of the cement may contribute to or aggravate the formation of efflorescence, such as chemical retarder, certain form oils and so forth.

HOW CAN EFFLORESCENCE BE PREVENTED?

Efflorescence will not occur if:

- soluble salts are eliminated
- moisture is eliminated
- water passage through the mass is eliminated.

The most effective way to reduce efflorescence in cases of cold or very damp weather is to allow additional exposure time on the brown coat prior to proceeding with the color coat. After this is done there may be the opportunity to wash away or brush off the growth before application of the colour coat.

CAN EFFLORESCENCE BE REMOVED? IF SO, HOW IS THIS DONE?

Most efflorescence can be removed by dry brushing, water rinsing with brushing or *light* water blasting. If this is not satisfactory, it may be necessary to wash the surface with a dilute solution of muriatic acid (1 to 10 percent). **Prior** to the application of the acid solution, always dampen the wall with clean water to prevent the acid from being absorbed deeply into the wall where damage may occur. Application should be to small areas at a time, usually not more than 4 sq. ft. with a delay time of about five minutes before scouring off the salt deposit with a stiff bristle brush. After this treatment the surface should be immediately and thoroughly flushed with clean water to remove all traces of acid. **Before any treatment is used on any masonry or plaster wall, the method should be tested on a small inconspicuous area to be certain there is no adverse effect.**

Since acid and other treatments may slightly change the appearance, the entire wall should be treated to avoid discoloration or mottled effects.

A NOTE ON EFFLORESCENCE

Efflorescence is a salt deposit that forms on the surface of concrete, masonry, clay brick and porous stone. It causes unsightly white stains, which can be particularly objectionable on coloured concrete. Efflorescence forms when water migrates through concrete, dissolves soluble compounds (calcium hydroxide) and evaporates leaving the solids on the surface. **Water, concrete permeability and soluble content determine how much and when efflorescence will occur.**

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Control efflorescence by mixing with low water/cement ratio, use curing compound and design for less permeability. Seal against water and stop leaks. Keep de-icing salts away. Efflorescence is easy to remove with water wash if caught early. If not, it converts to calcium carbonate which is removed with a dilute acid wash that will affect the surface appearance.

More Information: for more information on all aspects of good concrete construction contact:

Portland Cement Association 708.966.6200

National Ready Mix Concrete Association 301.587.1400

American Concrete Institute 313.532.2600

Concrete Construction Publications 708.543.0870

If further information is required please contact your IMASCO representative.

Contributed by:

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