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Efflorescence

Efflorescence is a crystalline salt deposit on the surface and in the pores of concrete, masonry, and other building products. A phenomenon reported as early as the 1870's and much studied since, it can appear as sulphate and carbonate compounds of sodium, potassium, calcium, magnesium and aluminum. Chlorides may also occur as efflorescence. This is usually a result of the use of calcium chloride as a mortar accelerator, contamination of masonry components (including sand) by sea water, or the improper use of hydrochloric acids in cleaning solutions.

There are several sources for efflorescence:

1. The movement of groundwater that moves upwards, by capillary action or "wicking", into masonry or concrete materials.
2. Salts in the soil that are in contact with paving can migrate above grade.
3. Natural-state salts that are found in mortar, concrete, or other building products. Although rare, some raw material used to make clay brick contain small amounts of salt. However, these small amounts are minor compared to studies that found two to seven times as much soluble material in concrete products versus fired clay material. W. E. Brownell concluded in his research study that the most common form of efflorescence comes from the "migration of 'free-alkali' solutions from the mortar to the brick" (applicable to rigid paving applications).

Fluorescing salts dissolve in water and are absorbed into the masonry pores. Typically, clay bricks can absorb 5% to 8% of their weight in water. Heat from the sun (or other source) begins to draw the moisture to the wall surface and as the water completely evaporates, the salt deposits are left on the surface.

Since humidity and moisture play a key role in the efflorescence process, some areas of the country will be effected more than others. Seasons will play a role, as precipitation typically is heavier during season changes and will increase the likelihood of efflorescence.

The most important solution to solving efflorescence in a veneer wall is finding, locating, and dealing with the source of water that is seeping behind the finished wall. The following conditions are potential sources:

- Lack of proper flashing and weepholes
- Poor foundation details
- Poor bond between brick and mortar

- Partially filled head joints
- Use of poor quality mortar
- Use of raked or scratched head joints
- Excessive mortar droppings in cavity

As a general rule, the removal of efflorescing salts from the face of masonry is a relatively easy operation. Efflorescing salts are water soluble, and generally will disappear on their own with normal weathering as the free salts dissipate from their source. This is particularly true of "new building bloom". White efflorescing salts can be removed with dry brushing or with clear water and a stiff brush. Heavy accumulations or stubborn deposits may require the use of special cleaners, like Sure Klean products. If used, always follow the manufacturer's directions and start with a non-visible test area. Never use muriatic acid, as damage to the mortar joints and wall can result, in addition to severe staining in some cases.

For further reference, see BIA Technical Notes - 23, 23A, 20, sure Klean & VanaTrol cleaners are manufactured by ProSoCo, Inc., Kansas City, KS. Other cleaners from different manufacturers are also available.

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