

Wienerberger Technical Guidance

EFFLORESCENCE

EFFLORESCENCE IN BRICKWORK

The term efflorescence is associated with the formation of soluble salts on the surface of clay bricks following saturation or heavy wetting of units. Efflorescence is a natural phenomenon involving several and complex factors, although it is recognised that the behaviour of a brick in practice is very much dependent on the care and workmanship exercised on site.

SOLUBLE SALTS

All clay bricks contain soluble salts, and test methods to establish the level of salts are included in the current European Standard BS EN 771-1. There are prescribed limits for water soluble compounds of sodium [Na], potassium [K] and magnesium [Mg]. The European Standard classifies the lower limit of the above salts as S2 and a higher limit as S1. All Wienerberger facing bricks are within the lower limit (S2) category.

PROCESS OF EFFLORESCENCE

Water entering a brick may combine with soluble salts to form a solution which can migrate to the outer surface as the brickwork dries, forming a crystalline deposit as the water evaporates. The process of efflorescence is quite complex and the quantity of salts that may ultimately appear on the surface depends on the type of salt, the crystal shape, the pore structure within the brick and on the ambient external temperature, as this affects solubility.

Efflorescence will only occur however when bricks in storage or brickwork during construction have become sufficiently wet. This is why protection of materials and partially built walls is of prime importance in preventing salts forming. Efflorescence is generally a temporary and harmless phenomenon.

SALTS PRESENT IN OTHER MATERIALS

Mineral salts appearing on the surface of the brickwork may emanate from a number of sources other than the brick; from associated materials including cementitious products, mortar and ground water.

It is important therefore to distinguish between efflorescence and other more permanent stains (soluble salts from brick units will readily be reabsorbed in wet weather conditions).



SALTS PRESENT IN OTHER MATERIALS**(CONTINUED)**

There is no reference to efflorescence in the current European Standard, and amendments in 1995 to the former British Standard for Clay Bricks (BS3921:1985 withdrawn) deleted reference to the test method for efflorescence and the resulting categories.

The original function of the British Standard laboratory test was not, as was commonly thought, to indicate the liability of brickwork to exhibit the visual effect of efflorescence, but to safeguard against the use of bricks with excessive quantities of very soluble salts, which might cause damage as a result of crystallisation.

The influence of external factors, including site practice and salts from other sources, meant that the results of laboratory testing proved difficult to relate to actual performance on site. It was for this reason that the test and the categories were deleted.

All authoritative bodies suggest that efflorescence should be allowed to weather naturally. The British Standard for Cleaning of Masonry (BS8221-1) suggests that this is preferable to chemical treatment (which may exacerbate the problem) although brushing of the deposit with a soft brush attachment may assist in the removal of salts.

A balance is ultimately achieved through natural weathering where some salts are washed away but others are reabsorbed and become trapped within the body of the brick.

The natural weathering process can be accelerated through gently spraying walls to simulate rain, but a high pressure hose should not be used as this will cause saturation of the brickwork, resulting in more salts becoming evident following a period of drying.

Should efflorescence occur where brickwork is the natural internal finish, clearly a natural weathering will not be possible and a spray application should be avoided. The appearance of internal brickwork can be improved by applying a damp sponge, rinsed frequently in clean water, to encourage soluble salts to transfer to the sponge. It may be necessary to repeat the treatment.

The likelihood of staining can be minimised through practical design and detailing, and by adopting good site practice to avoid saturation of materials in storage and construction.

**CRYPTOEFFLORESCENCE**

Although it is usually a harmless problem, there have been cases of damage caused by efflorescence. Crystallisation of salts just below the surface of the brick can cause spalling – this is known as cryptoefflorescence. This problem is often associated with magnesium salts. Cryptoefflorescence is associated with a large build-up of salts and usually occurs where old, relatively weak bricks are re-used inappropriately, particularly in areas of excessive dampness. It can also occur if the brickwork has been covered by a surface treatment because the salts may crystallise behind.

