

## Efflorescence

White patches appearing on the surface of concrete paving naturally cause concern. However, such concern is rarely justified in the long term, as the appearance is normally the result of “*efflorescence*”.

This term is frequently used to describe whitish deposits or stains on building materials. However, there are many forms of efflorescence, which have little in common other than the fact that they result in white discoloration. In particular, it is worth noting that efflorescence on clay bricks is formed by a totally different process.

*Efflorescence* as generally found on concrete paving products can be categorised as “lime bloom” which is a deposit apparent either in the form of white patches or as a more general lightening in colour. When the latter effect is seen it is often misinterpreted as a fading or “washing out” of the colour from the concrete.

Lime bloom, when it occurs, is a natural phenomenon brought about as a result of the normal chemical reaction between cement and water. A product of this reaction is calcium hydroxide, (lime), which is slightly soluble in water and under certain conditions can migrate through damp concrete to the surface where it in turn reacts with atmospheric carbon dioxide to produce a deposit of calcium carbonate crystals.

This deposit gives rise to the white patches or overall lightening referred to earlier, but is normally extremely thin. When it is wetted, the deposit becomes transparent and seemingly disappears.

The occurrence of lime bloom on the surface of concrete paving, products is a spasmodic and unpredictable phenomenon but a significant factor is, nevertheless, the weather. Lime bloom forms more readily when concrete becomes wet and dries slowly and therefore occurrences are more frequent in winter months. It is generally only likely to be brought about in the early life of concrete paving products and materials that have been in place for a year or more without experiencing lime bloom are unlikely to do so. The phenomenon is temporary and will generally disappear with time (usually 6 months to 2 years). It is superficial and does not affect strength or durability.

### Removal of lime bloom

Lime bloom can generally be expected to disappear over a period of time, depending on the environment to which the paving is subjected. Rainwater, being slightly acidic, dissolves the deposits and where paving is fully exposed to the weather the efflorescence could typically be expected to disappear with time. Removal would be accelerated by abrasion caused by pedestrian or vehicular trafficking.

Most proprietary cleaning treatments contain acids and detergents, so it is important to ensure that the manufacturers' directions (and environmental regulations) are carefully followed. Incorrect or careless cleaning may result in injury or damage and discoloration to the surface of the concrete paving. As a good precaution, a test should be carried out in a small and inconspicuous area before undertaking cleaning over the complete area of paving in question.

The procedure is best carried out in cool conditions. When the paving is hot, rapid evaporation may lead to recurrence of deposits. It must also be remembered that acid attacks concrete and its over application may alter the appearance of the paving,

Once the paving is dry, the joints should be inspected and repaired if necessary.

Long-term experience suggests that it is unlikely that lime bloom will recur after removal with an acid treatment as outlined above. It is not possible, however, to give a guarantee against recurrence.

A further possibility, which may be considered upon completion of successful cleaning, is the use of a polymer sealer. Such sealers may enhance or change the colour and the overall appearance of the paving is likely to be markedly different as a result. They may inhibit the formation of efflorescence but there have been instances of recurrence of lime-bloom underneath the coating, on paving which has undergone the treatment described.

Generally, polymer sealers should only be applied to paving after sufficient time has elapsed, to allow any efflorescence to disperse naturally and to ensure that the paving is completely dry. The manufacturers' application procedures should be strictly followed.