



efflorescence

description & mechanism

definition & description

Efflorescence is the term that describes the formation of salt deposits, usually white, on the surface of concrete products causing a change in appearance.

Apart from the unsightly discolouration, efflorescence is generally harmless. It is described as "a skin trouble and not a deep-seated disease".

There are three forms of efflorescence that can develop on concrete pavers, primary, secondary and crypto-florescence. Primary efflorescence occurs during the curing or hardening phase of concrete pavers. Secondary efflorescence is the efflorescence resulting from the weathering of the cured concrete pavers. Crypto-florescence is the deposition of salt within the pores of concrete pavers below the exposed surface. The force of crystallisation growth may cause disintegration.

With time, efflorescence becomes less extensive. Efflorescence is most obvious in winter but may be observed throughout the year after a heavy rain and drop in temperature.

mechanism – physical process

The formation of efflorescence depends on a number of natural physical processes involving both salt and water transfer in and out of concrete. Specific conditions may dictate the extent to which any of the many processes involved may take place and hence may dictate the extent of efflorescence occurrence. Various physical processes are involved. In practice, these are inter-related creating a complex mechanism.

mechanism – chemical processes

Alkalis in the concrete react with carbon dioxide to produce two forms of efflorescence, sodium and potassium carbonate and calcium carbonate. Alkalis and calcium hydroxide in solution in the pores are able to migrate to the surface. This migration depends on permeability, voids and moisture content. At the water-air interface, atmospheric carbon dioxide reacts with these hydroxides to form calcium, sodium and potassium carbonate. Penetration of water can cause efflorescence in the same way.

Sodium and potassium carbonates appear on the concrete products as a soft white fluff that can be easily removed (although it may appear again). This type of efflorescence usually appears if the product is exposed to wetting and slow drying.

Calcium carbonate appears usually as white "bloom" diffused over certain areas. In severe cases it appears as a hard white crust. It is most troublesome and difficult to remove. Calcium carbonate efflorescence is likely to form on concrete products in which hydration is interrupted by premature drying and which has been subsequently wetted.

