

EFFLORESCENCE – INFO SHEET

"Efflorescence" is a term used in the construction industry to describe white deposits or stains on the surface of the materials used in the façade. There are a number of areas that are covered by this general term and it is necessary to note the following:

- There are more than one type of efflorescence produced by different chemical reactions and they are common only in the fact that they derive white colourations to a surface.
- Efflorescence in cementitious renders are generally not the same as those found in brickwork.
- Efflorescence is not the only cause of surface colour variation.

The three main forms of efflorescence which can form on cementitious products are:

- Limebloom
- Weeping
- Crystallization

Limebloom is by far the most common of these possibilities.

Limebloom

Particularly prevalent in pigmented / coloured render products which use Portland cement in their chemical make up. It can appear as patches of surface deposit or as an all over lightening effect which can sometimes be wrongly diagnosed as the render fading.

It is the Portland cement that is responsible for the Limebloom. The water that is added to the cement causes a number of reactions that lead to the setting / hardening of the cement. A bi-product of these reactions is lime (calcium hydroxide). Calcium hydroxide is only slightly soluble in the water that is being used but on occasion it may work its way through to the surface of the wet render. When it reaches the surface it will react with atmospheric carbon dioxide and form calcium carbonate that we see as the white crystals on the surface of the render.

The visual appearance of these deposits looks similar to a weak white wash of the surface that can be in the form of localised patching or as a more general all over lightening of the surface as previously mentioned.

Where and when Limebloom will occur is fairly random and unpredictable. One factor is the weather. Limebloom occurs more frequently in the winter months when the applied render is likely to become wet or damp for days on end. Long periods of wet weather, snow or fog do help lime bloom to be produced. These prevailing conditions also have the effect of retarding the drying of the render and as such mean that the Limebloom is not visible until drying starts to occur. This can lead to confusion as there is a theory that hard winds can cause Limebloom, however, it would be more reasonable to believe that hard winds cause faster drying and make the Limebloom that is already on the surface in the form of calcium carbonate visible to the naked eye.

Given the chemical process involved / required to produce Limebloom it is unlikely that Limebloom will occur beyond the first twelve months of its life i.e. once all reactions within its chemical composition have ceased. Limebloom has no effect on the performance or durability of the applied render and generally disappears / weathers away over time.

Lime Weeping

Appears as a build up of white crystalline materials and generally at areas where moisture is able to escape to the surface of a cementitious substrate from inside. It is a similar process to that described in Limebloom above. The water that is escaping through the render from the inside dissolves calcium hydroxide from the render and deposits it on the surface at the escape point. The calcium hydroxide then reacts, as above, with the atmospheric carbon dioxide and produces a deposit of calcium carbonate that build up over time to leave a localised deposit.

Because of the nature of the build up process involved in Lime Weeping it is most likely to be noticed later in the life of a building or structure. Lime Weeping is not generally a cause for concern



but does demonstrate that water is moving through a structure. If this structure is likely to be damaged by this process then remedial action may be required.

Crystallization of Soluble Salts

This type of efflorescence generally only occurs in brickwork and rarely in render. In appearance it is a white fluffy deposit.

The deposit in this case is not the same as that for Limebloom or Lime Weeping as it is formed of soluble salts that are not generally within a render mix and not calcium carbonate as above. Where salt water (sea water) containing sodium chloride is used this is common. On occasion salts can be drawn into the render from external sources and they are deposited on the surface when natural evaporation of the solvent(water) takes place.

Surface salt deposits are not generally harmful to the render but the following points require noting:

- Sulphates in the form of salts can attack render
- Chlorides (sea salt etc) can lead to attack of steel in reinforcement
- Weak renders can sometimes allow salts to crystallize under the surface and spalling may occur.

Prevention

The prevention of Lime bloom has been considered for many years and to date there is no recognised and accepted method. There are, however, some actions that can be taken to reduce the risk of it happening. The deposits of calcium carbonate need to be prevented from forming on the surface of the render.

- Changes to the mix – A more coarse aggregate can cause the calcium carbonate to form below the surface of the render. This can however lead to a weaker mixture. These are not fail safe methods and Limebloom has been known to occur when these steps have been taken.
- Cure Control – As mentioned earlier – well cured render is less likely to bloom, however, conditions ideal for drying can make lime bloom occur. Wetting of the surface of the render and hessian sacking is not recommended as this can cause Limebloom. There are some spray on curing membranes that are available but these can and do alter the appearance of the render.
- Surface Applications – There are some applications that reduce the tendency to

Limebloom. Such applications promote shedding of water from the surface. Sealers that effectively hold back the Limebloom can also be very effective in stopping the Limebloom coming to the surface. These treatments can be clear of pigment but may alter the appearance of the render.

- Conditions – Protection of render from weather is also an option. Protection must not be touching the render or allowing moisture film to trap on the surface of the render. It is worthy of note that polythene sheeting can cause condensation / sweating and have the effect of causing white patching if not ventilated correctly.

Removal

Limebloom should disappear over time and if possible it is worthwhile allowing render to age for a period to see if any Limebloom leaves on its own. Rainwater is slightly acidic and as such will assist in the removal of the Limebloom over time on exposed elevations. When an elevation is sheltered the Limebloom will take considerably longer to disappear.

Washing with a diluted acid solution is an option for immediate removal. Appropriate care must be taken when using acids and other hazardous chemicals. N.B. Acids are naturally corrosive and over exposure of the render to the acid used will result in a change of appearance.

A dilute hydrochloric acid solution (6% to 8%) is generally used. Weaker solutions may require more applications but will be kinder to the render.

Surface should be wetted prior to applying the acid as this will control the suction of the acid into the render and prevent it migrating into the render and possibly doing harm to the render itself. The render is not the target for the acid.

Once acid is applied to the surface by low pressure irrigation spray it must be immediately removed by use of hot water power spray. Once dry it will be clear if a further application is necessary.

The alkaline nature of render neutralizes the acid on application and as such the operation is safe and poses no long term effect to the render.

Once removed by this method it is highly unlikely that there will be any recurrence of Lime Bloom, however, this cannot be guaranteed.

