



TECHNICAL BULLETIN

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RE: Efflorescence and mineral film discoloration on Portland cement grout.

Efflorescence is composed of minerals that migrate to the surface of grout joints and crystallize forming a whitish deposit. Part of these minerals are innate in the composition of Portland cement whose components are mined from the ground and processed. These minerals may migrate from anything containing Portland cement including concrete slabs, cementitious backerboards, setting materials or grout. They may come from under the slab if proper moisture barriers are not in place or have been damaged. Additional minerals can also come from the water source used to mix the grout or water used in the maintenance of the grout.

Many kinds of salts have been detected in the crystalline structures of efflorescence. These include sodium sulfate, potassium sulfate, sodium carbonate, calcium sulfate, sodium bicarbonate and calcium carbonate. Efflorescence can form shortly after grouting resulting in a new installation that may look splotched or completely covered with a white crust or film. Although unsightly, the mineral deposit can be removed by proper washing with a mild acid solution. However, this removal process should not be done prior to dissipation of all the excess moisture in the installation. Removal of the mineral deposits prior to excess moisture dissipation may result in the reappearance of the efflorescence

There are some procedures that can be implemented to minimize the chances of efflorescence occurring. The minerals that cause efflorescence must flow with excess moisture to the surface of the grout joint where they crystallize. Minimizing excess moisture in the installation will inhibit this mineral flow.

With tiles becoming larger and more dense, the polymer modified setting materials for the tile, sometimes applied in a medium bed thickness, require longer set times before the excess moisture is dissipated from underneath the tile. This can also be magnified when waterproofing or crack isolation membranes are placed over the substrate prior to application of the setting material. This excess moisture has nowhere to escape except through the grout joint. Waiting as long as possible after the tile is set before grouting (minimum 48 hours) will allow more of the excess moisture in the setting material to escape which will decrease the chances of efflorescence occurring.

Dense bodied tile (porcelain), polymer modified setting mortar and dense substrates prolong the time grout takes to become firm before clean up. Under these conditions, water mixed with the grout has nowhere to go but upward, and it can carry dissolved minerals to the grout surface. Grouting too soon (prior to the setting material losing its excess moisture), grout mixed with too much water, initial cleaning before the grout joint is properly firm or cleaning with too much water will create the conditions for efflorescence to occur, especially in cooler conditions (50-70 F).

Texas Cement incorporates chemicals within the grout to minimize the formation of efflorescence, but efflorescence cannot be totally eliminated. Grout to water ratios in mixing, evaporation conditions, and cleaning procedures are actions and events beyond the control of the grout manufacturer and can have a great deal of influence on the occurrence of efflorescence. Because jobsite conditions change from one application to another, it is important to adjust grouting techniques to

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minimize the conditions that are favorable for the formation of efflorescence.

If efflorescence does occur, removal may be achieved with C-Clean 985 (sulfamic acid). C-Clean is intended for use with veneers that are not sensitive to acid such as ceramic or porcelain tile. Non-acidic cleaners must be used for acid sensitive materials such as marble, limestone and travertine. Contact Technical Services for recommendations.

Never seal a grout that is not satisfactory in color, hardness or appearance.

Normal sealers are designed to protect a "good" grout job. They aren't designed to correct a "problem" grout job. Application of normal sealers over a "problem" grout will only tend to enhance the grout problem and prevent usage of simple correction measures.

After removal of efflorescence and allowing the grout to completely dry, a grout stain may be used in situations where a permanent seal and color uniformity is desired.

Additional efflorescence information is available from the following associations:

NTCA Reference Manual, Document A-7

MMSA Bulletin No. 6 and No. 9

Portland Cement Association: Efflorescence

If you require further assistance or additional information please contact your Texas Cement Texas Cement Technical Services Department at 800-669-0115.