

Wienerberger Technical Guidance

METALLIC STAINING

IRON STAINING

Iron staining usually appears as a stain to the brick face or mortar joint. The staining can come from metal embedded in the structure, or it can be derived from the brick if made with clays with high iron content, or from the mortar sand.

Iron staining occurs due to salt migration when compounds of iron (trace elements within the raw material) are drawn from within the body of the brick and deposited on the surface as a result of moisture movement. Here they will oxidise and produce a stain similar to rust.

The high temperature manufacturing process normally ensures that various metallic salts are held within the clay body at the firing stage, therefore for salts to be deposited on the surface a high degree of saturation is required. To avoid iron staining, bricks and brickwork should be properly protected from saturation in both storage and construction, as per accepted good site practice.

Iron staining will naturally recede over a relatively short period of time, but if the process needs to be accelerated, the staining can be treated as follows - removal from the face of the mortar joints can be achieved by rubbing the stain with a rough file or with pieces of hardened mortar. For overall cleaning, the method typically involves a surface application of a dilute hydrochloric acid solution. A proprietary brickwork cleaning solution (hydrochloric acid based) applied as part of the routine cleaning, maybe effective. This would not have a detrimental effect on the iron compounds (as it might with other metallic salts such as vanadium).



MAGANESE STAINING

Manganese staining manifests itself as a dark brown or black stain concentrated along mortar joints. It is caused by manganese dioxide (used as a colouring agent during manufacturing) that has dissolved in rainwater, construction water or muriatic acid.

During the brick firing process, the manganese colouring agents undergo several chemical changes, resulting in manganese compounds that are insoluble in water. They have varying degrees of solubility in weak acids. Once dissolved, these compounds may migrate in solution toward the surface of the brickwork.



MAGANESE STAINING**(CONTINUED)**

Bricks may also absorb unbuffered hydrochloric (muriatic) acid during cleaning. It is also possible that some geographical areas may be subject to acid rain.

Manganese staining is closely related to efflorescence since it is the sulphate and chloride salts of manganese that travel to the surface of the brickwork. When the solution reaches the mortar joints, the salts are neutralised by the cement or lime in the mortar, producing insoluble manganese hydroxide. The manganese hydroxide precipitate is deposited on the mortar joint and when dry, converts to brown manganese tetroxide resulting in the stain.

As with iron staining, manganese staining is best left to weather away naturally, however if this is not acceptable the same remedial measures as iron staining can be used.

VANADIUM STAINING

One of the mineral elements found in the raw material of clay bricks is vanadium, which normally only occurs as a complex salt in fire clays used in the production of buff coloured products. It can however, on very rare occasions, also occur in red and brown products.

Like most soluble salts it requires saturation to bring it to the surface, where it appears as a yellowish stain that may change to a green or even light brown colour.

Vanadium does not come and go in the same manner as a white efflorescence, and should really be described as a true stain.

Vanadium staining can be largely avoided by the protection of bricks and newly built brickwork to avoid saturation. The first 72 hours after laying is when brickwork is most vulnerable to the elements, as mortar is still undergoing the hardening process.

It is advised not to use proprietary hydrochloric acid based cleaning solutions for vanadium staining as these can cause an adverse reaction leading to a permanent dark coloured stain. The cleaning of other stains should also be avoided while vanadium salts are visible.

If necessary, vanadium staining can be treated cosmetically. The method typically involves a surface application of a dilute oxalic acid solution. It is advised that a small discreet trial area be treated initially to gauge its success.

