

Let's get physical

Jonny Seccombe, chairman of Lifescience Products, gives the lowdown on physical water conditioners

Physical water conditioners (PWCs) are well known to be effective at reducing scaling in plumbing systems and have been very widely adopted in the UK where Part L recommends that in hard water areas some kind of device be fitted to reduce the accumulation of limescale in water heaters.

What is less well known are two other capabilities some PWCs possess; their ability to remove existing scale from plumbing systems and fittings and to provide partially softened water.

Preventing new scale

When retro-fitted to an existing plumbing system that is already encrusted with scale, some PWCs are capable of removing substantial amounts of the pre-existing scale as well as achieving their main purpose of preventing new scale from forming. The mechanisms whereby this descaling takes place are not fully understood and many manufacturers offer a range of explanations, some of which are inadequate to explain what can easily be observed in the field.

Generally what we see is the scale being broken up and dispersed in the water flow. For it to be 'dissolved' it would require a significant reduction in the pH, increasing the acidity of the water

which, by definition, a non-chemical PWC is not capable of delivering. What can be observed is the scale breaking up in layers, especially in the zone adjacent to the surface where it is attached. Chunks of scale can break away from surfaces into the flowing water or drop into the bottom of a tank.

The characteristics of this debris varies greatly according to composition of other minerals, such as iron, caught up in the scale. Sometimes it breaks down in large chunks and others into a soft powder – the former causing serious problems in a plumbing system if

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precautions are not taken to protect sensitive plant such as heat exchangers.

It may be necessary to fit strainers on the feed lines to heaters to protect them from loose scale debris, which would then require frequent checks to clean out the strainer to avoid reducing flow to the heater. Fortunately the de-scaling process can be concluded in just a few weeks so shouldn't be an ongoing maintenance burden.

Clearly with new build

construction, descaling of a plumbing system is not an issue. Where it can be of significant benefit is to older systems that are sensitive to Legionella. The bacteria causing Legionella is much more difficult to control in a heavily scaled environment, so anything that is going to reduce scaling should make Legionella treatment much more straight-forward. Some PWCs are capable of very rapid and economic descaling and are, therefore, a helpful addition to the toolbox of any water treatment engineer.

One of the benefits of using certain types of electronic PWCs is

something that you need a water softener for. This statement is easy to disprove.

It is important to understand that water is hard because it contains 'dissolved' minerals, principally calcium. This calcium in solution reacts with soaps so that lathering is inhibited and "scum" is formed. A water softener removes this dissolved calcium by exchanging it with sodium, which doesn't precipitate as scale when water is heated and doesn't react with soap in the same way as calcium.

When hard water is heated, some of the calcium comes out of solution and forms scale which sticks to heaters and pipes. Not all of the calcium precipitates, however, and this calcium still in solution reacts with soap inhibiting lathering.

Nucleation seeds

When a PWC is installed on the cold feed to a water heater it generates nucleation seeds in the water so that the scale that would normally form on the heater surfaces instead forms in suspension, on the nucleation seeds in the water.

Some PWCs are so effective at generating nucleation seeds that they encourage even more scale to form, in suspension, than would normally occur. This means that there is less dissolved calcium remaining in the hot water and, therefore, the water is softer than it would otherwise be.

The effect of this softening can be seen in an improvement in lathering and is also felt by people showering and bathing. The extent of the softening is clearly not as much as a conventional softener, but the added benefit is that you don't get that slippery slimy feel from the water caused by the added sodium.

When you compare a PWC with a softener it's easy to show that both inhibit scale and provide softer water but, interestingly, only a PWC is also capable of descaling a plumbing system.



PWCs can remove existing scale encrustation as seen in this valve fitted here. After just 11 weeks the encrusted scale has broken away