

Physical water conditioning understood

Darren Stacey, head of sales and marketing at Lifescience Products, takes a view on physical water conditioning and explains why getting the right training is just as important as getting the right product...

Technological advances in the water treatment industry have led to an increase in alternative technologies being used as replacements for more traditional types of hard water treatments. Physical water conditioners are now accepted by many as a low cost, easy to install and, in some cases, maintenance free alternative to chemical softening. But with so many different types of water conditioner available and still no official UK standard by which to judge them, how can plumbers be sure they're making the right choices?

Well, let's start with the science. Hard water contains dissolved calcium minerals which are picked up as rainwater percolates through limestone bedrock. These hardness minerals can be brought back out of solution when the water is heated or subjected to a pressure drop. It's the build-up of these deposits in the form of encrusted limescale that causes water heaters, valves and appliances to fail, reduces energy efficiency and provides a hiding place for bacteria, including Legionella.

Traditional base exchange softeners deal with this problem by replacing calcium with sodium, preventing the precipitation of limescale. Where well maintained and serviced regularly, 'salt' softeners are a tried and tested technology. However, they can be expensive, require regular dosing with salt and often there is a need to plumb a separate potable water supply to provide safe drinking water.

LIMESCALE ENCRUSTATION

Physical water conditioners are unlike base exchange softeners in that they don't need to remove the calcium from hard water to prevent limescale encrustation. They work by encouraging dissolved calcium to precipitate in suspension rather than encrusting surfaces. This means hardness minerals continue to be brought out of solution during a 'scaling event' but form onto seeds in the water, thus mitigating their effect on water heaters, valves, appliances and pipes.

Understanding the different mechanisms employed by physical water conditioners to encourage this process is the first step towards getting things right.

Many release zinc to act as the seed on to which limescale can form. The most effective tend to use galvanic corrosion to break down a sacrificial zinc anode over time. They are often the least expensive and easiest to fit of the inline water conditioners and can be very effective.



A build-up of limescale from untreated hard water can quickly cause water heaters and valves to fail



Some electronic water conditioners utilise radio wave technology to provide continuous treatment, irrespective of flow

However, their lifespan could be limited to just a couple of years due to passivity as a result of scaling or the anode becoming exhausted.

For those looking for longer-term protection, particularly those responsible for the ongoing maintenance of domestic water systems, an electronic/electro-magnetic water conditioner may be a more sustainable option.

There are a number of electronic water conditioners available in the UK, with some being considerably more effective and reliable than others. By and large they act indirectly to encourage the formation of limescale in suspension. They do this as part of a two stage process whereby a signal is transmitted into water to create pre-nucleation clusters that then act as seeds on to which scale is forced to precipitate when the water is heated or a pressure drop occurs.

Most types will only treat water locally to where they are installed, relying on a "memory" effect to prevent scale encrustation further downstream. Some can treat static water but the

effect is often very shortlived so for these devices the closer together the two stages occur, the more effective the treatment is likely to be.

Other electronic water conditioners utilise radio wave technology to create pre-nucleation clusters. These waves can be continuously transmitted through the water, both upstream and downstream, irrespective of flow. Providing there is continuity of signal they'll provide constant treatment to all of the water all of the time, without any reliance on "memory" effect.

This unique characteristic allows for continuous treatment of sites where long periods of low or intermittent usage are common, but continuous treatment is predicated on these units being correctly installed downstream of pumps and storage tanks, which could cause signal degradation.

For heat exchangers with pumps on the cold water inlet and some modular type water heaters it's often more effective to treat the outlet side of the heater, utilising a back signal to protect the heat exchanger while also continuously treating the stored hot water in a buffer vessel.

CONTINUOUS PROTECTION

Hot water secondary returns should be treated by locating a supplementary unit downstream of the return pump to ensure continuous treatment of the returning hot water as it re-enters the water heater. Similarly for irrigation systems and re-circulating systems, locating a unit after the pump as close to the 'scaling event' as possible will provide continuous protection.

So while it's true to say that some electronic water conditioners can provide greater flexibility through continuous treatment, understanding where best to locate them is still crucial. Such understanding can only really be derived from those manufacturers who provide training opportunities for installers and specifiers.

Traditionally access to training has been limited to a handful of seminars offered to mechanical and public health engineers.

For those who only have a few minutes on site or in between call-outs, access to online content is crucial. But whilst there's no shortage of material online cutting through to find reliable information isn't always easy.

Our solution has been to launch the free to access Lifescience Academy, home to a new e-learning module, literature, technical information and installation guides. The resources can be accessed whenever they're needed and provide all of the information a plumber needs to install with confidence.