Phosphate Dosing: The Answer To Limescale And Soft Water Corrosion

When the average householder thinks of limescale the first place they are likely to consider is their kettle, followed by appliances such as the washing machine. But, as all good plumbing and heating installation engineers know, left untreated this destructive deposit is also a menace in heating systems.

Limescale can form on any surface where the water is heated. It is not just unsightly when visible, such as on taps and shower heads. Its unseen damaging effects can be costly, particularly if allowed to proliferate inside pipework and, worse still, on a boiler's heat exchanger.

With pipework clogged up the waterways narrow, leading to reduced water pressure, poorer flow rates and a subsequent increase in energy demand; the consequences of these are higher bills and maintenance costs.

For appliances such as kettles it is easy to spot limescale and the process of 'de-scaling' is common practice.

What is, perhaps, not appreciated is that protecting a household heating system and connected appliances can also be straightforward.

The correct application of phosphate dosing will protect against the build-up of limescale and extend the life of the water appliance.

Any competent plumber can install a suitable dosing unit, such as the market-leading Combimate from Cistermiser. As it doesn't require any electrical work or special tools to install, there is minimal disruption or hassle when fitting a Combimate unit.

How does phosphate dosing work?

First, let's consider some facts about limescale.

Limescale is comprised of calcium and magnesium, two minerals that form a residue when hard water is heated and evaporates. Around 60% of the UK lies within a hard water area.

Limescale builds in hard water conditions at a rate of about 1mm a year. According to British Water, the trade association for the UK water industry, hard water used by a family of four accumulates some 70kg of limescale in those 12 months.

Also, every 1.6mm, or 1/16" of scale in a heating system causes a 12% loss in heating efficiency.

Energy waste is only part of the equation. Scaling can cause premature failure of the boiler heat exchanger. As the limescale builds up this creates an insulating layer, inhibiting heat transfer to the water. This component then needs to be replaced and often whole boilers are written-off and new units are required.

But all this can be prevented with the installation of a phosphate dispenser, such as Combimate which uses Combiphos to phosphate dose the water. The phosphate does not alter the hardness, or softness, of the water but prevents limescale build-up.

The calcium within the water attracts the phosphate and as a result the minerals are kept in suspension as the water flows through the hot water system, preventing the calcium sticking to hot surfaces and leaving a deposit of limescale.

The phosphate also forms a thin protective layer on metal surfaces, such as the inside of pipework. A concentration of two to three parts per million is sufficient to achieve both of these effects.

It may surprise some to read that naturally occurring soft water can also be harmful to a water system.

Containing very few natural minerals, this ‘pure’ water has a low PH, making it slightly acidic and aggressive to metals, causing corrosion. Left unchecked, this will create pinholes in the pipe and leaks may result.

A symptom of such corrosion can be when the residue, caused by oxidisation of the metal pipes, turns tap water brown.

However, phosphate dosing, or 100% safe food-grade polyphosphate dosing to be more descriptive, will tackle this softer water problem as well as limescale caused by hard water.

Copper pipe with scale plug

Copper pipe - heavily scaled

Galvanized pipe heavily corroded

Galvanized pipe with Combiphos protective layer

Simple installation

Installing a Combimate unit could not be simpler. About the size of a teapot, it typically requires very little space.

It can be plumbed directly onto the cold water supply to the property, protecting the whole hot water system, or to an individual appliance.

Installation engineers should recommend a flow-through system (such as Combimate) to their homeowner clients as this will make sure all the water comes in contact with the phosphate, ensuring a consistent level of dosing is maintained. Not all limescale prevention systems achieve this.

Combimate offers multiple configuration options with the inlet and outlet clearly marked and the plumbing connections are achieved using compression fittings, typically to 15mm or 22mm copper pipe.

The only other work needed is to fit it to the wall. The whole job can be completed in less than an hour.

The Combimate unit should be kept 450mm away from any heart source as the pellets containing the phosphate will degrade more quickly if they get hot. Fitting in a warm environment, such as an airing cupboard, will dissolve the phosphate at a faster rate, so the ideal location would be at room temperature.

A totally automatic system, no user interaction or power are required. Integral mains water shut-off valves when the dosing unit cover is removed ensures easy maintenance.

All that is required to maintain optimum efficiency and limescale prevention is an annual Combiphos phosphate pellet refill to top-up the unit, a five-minute task that requires no special tools.