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**JONNY SECCOMBE** LOOKS AT THE METHODS AVAILABLE FOR PHYSICAL WATER CONDITIONING AND COMMENTS ON THEIR EFFECTIVENESS.

# Physical water conditioning – what's new?

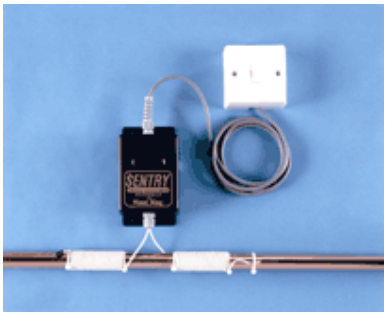
A conference on scaling and corrosion at Cranfield University last year threw the spotlight back onto physical water conditioning as a useful technology for scale prevention – but posed questions about the effectiveness of the various systems on offer.

## FANCIFUL EXPLANANTIONS

One thing that is clear from their published literature is that few manufacturers agree what physical water conditioners actually do. Some of the explanations are so fanciful that the only conclusion that can be drawn is that many manufactures haven't a clue how their products actually work!

Whilst people tend to group all physical water conditioners under one description, it is now reasonably well established that there are distinctive differences between them.

There are probably three different mechanisms at work, each of which fundamentally differs from the others and each having advantages and disadvantages.




ABOVE:- The Water-King Sentry is a powerful electronic water conditioner.

The most commonly used systems utilise the effects of magnets or differing metals to release zinc into the water. Zinc can act as a scale inhibitor in

certain circumstances by bonding with calcium carbonate, thus stopping it from encrusting surfaces.

Magnets cause zinc to be released by generating a direct current when water passes through the magnetic field. This causes corrosion, and zinc is a byproduct of the corrosion. There has to be a source for the zinc, which is either the magnetic system itself or the pipework or fittings. The effectiveness of this system therefore depends on flow rate and an adequate source of zinc.

Likewise, electrolytic systems release zinc as a byproduct of the direct current created across dissimilar metals. Flow rate is less important, but other metals in the water can reduce effectiveness.

# PASSIVITY

The major drawback of both these systems id ‘passivity’. Over time, and depending on water quality, scale forms on surfaces that are corroding. As the scale builds up, the corrosion process slows down until it may stop completely. This generally happens before the source of zinc is exhausted, but the result is the same. Commonly, after a period of months or a couple of years, both magnets and electrolytic systems tend to become less effective or stop working altogether.

There is evidence that very large magnetic fields can have an inhibiting effect on scale without releasing zinc, but such systems are not generally commercially viable, nor are they properly understood. There might also be some crossover into the other two methods described.

Electronic systems have appeared in many guises over the last few years, but it seems that they are probably all trying to do the same thing.

Currently there is evidence to suggest that iron (Fe) compounds are reduced in such a way by the induced electric charge that they stimulate the formation of limescale in the form of fine particles in suspension in the water. These are carried away in the water and avoid encrusting surfaces. For these systems to work, there needs to be a minimum amount of iron in the water; where levels of iron are very low they tend to be less effective.

# DISTINCT ADVANTAGES

Where water quality is appropriate, on the vast majority of sites, electronic systems have the distinct advantage of being able to continue working for many years with very low power consumption and needing no maintenance or servicing. The more powerful systems are also capable of treating static water, which makes them very versatile weapons in the war against limescale.


ABOVE:- One of the fe physical water conditioners to pass the German DVGW W512 scaling test is the Judo Biostat 2000.

The third main method of physical treatment involves stimulating precipitation by inducing very high voltages locally in the water. This momentarily increases the pH to a very high level and causes scale to form within the treatment system. The problem with this method is getting rid of the scale that so forms. So far only three German manufactures have come up with a solution to this problem. Two use a replaceable cartridge and the third use rotating wire brushes to expel the scale back into the flowing water. Whilst these systems have the capability of passing the German DVGW W512 scaling test, a rare feat for physical conditioners, they are expensive, and their limited flow rates make them less attractive in larger commercial applications.

It is sad to note that research into physical water conditioners in the UK has been severely held back by the relentless pursuit of the lowest possible price for a product, regardless of its provenance, reliability or effectiveness. The market is so crowded with ‘me-too’ replicas rustled up by ‘preferred suppliers’ that those few companies dedicated to original research have great difficulty in achieving recognition for their better portfolio of products.

# WELL SERVED

In spite of this, the UK market is well served by some of the most innovative and effective physical water conditioning systems available anywhere in the world – most of them home grown.

It would be helpful if the Energy Saving Trust could be persuaded to recognise that limescale encrustation is a significant squander of energy ( they seem to be alone in this view ), as this would create a stronger demand in the energy-efficiency field.

*Jonny Seccombe is managing director of Lifescience Products Ltd, Ranger's Lodge, Cornbury Park, Oxon, OX7 3HL*

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