

# Aquafacts No.19

## Water conditioners / physical water treatment devices

*(Aqua-Nouveau Limited acknowledge the United Kingdom Water Treatment Association for the majority of the contents of this fact sheet).*

The term water conditioner (sometimes called *physical* water conditioner or *physical* water treatment device) is generally used to describe a wide range of products that are designed to prevent lime-scale build-up on heat-exchange surfaces when hard water is heated. Unlike softeners or filters which work by removing the ions (hardness salts) which form the lime-scale, water conditioners generally work by affecting the chemistry of the precipitation reaction: suppressing lime-scale formation, reducing the rate of scaling, or by altering the form of the scale or the chemistry of the precipitation mechanism itself. There are lots of different types of products on the market with a variety of claimed operating mechanisms.

The most common types of water conditioner include:

*Magnetic* – Claimed to prevent scale-build-up by influencing the type of lime-scale crystals precipitated – causing more needle-like aragonite crystals to be formed, which find it harder to stick to heat-exchange surfaces, than the normal calcite, which forms harder surface deposits. Laboratory research has shown that the growth of lime-scale crystals in a saturated solution is affected by the application of an external magnetic field.

*Electrolytic* – Work by adding a small trace of zinc (sometimes iron) to the water which has the effect of suppressing lime-scale formation and providing nucleation sites (seed crystals) where precipitation occurs which is washed away by the water flow. Laboratory research has shown a relationship between the amount of zinc added and the reduction in lime-scale precipitation achieved.

*Electronic (Electromagnetic)* – Generally claimed

to work by causing dissolved hardness salts to cluster together to form nucleation sites for lime-scale precipitation rather than forming on heat-exchange surfaces.

*Electro-chemical* – Currently mostly of German or Austrian origin - Usually containing some type of cartridge filled with ceramic beads which are claimed to cause some the dissolved calcium and magnesium ions to precipitate as seed crystals which then act as nucleation sites for bulk lime-scale formation when the water is heated. Often quite large in size and requiring a mains power supply.

*Electrostatic* – Claimed to use the build-up of static electricity derived from the water flow to enhance the nucleation of seed sites for lime-scale precipitation.

### Why fit one?

The UKWTA has demonstrated how lime-scale build-up has a major impact on reducing the efficiency of domestic water heating appliances – so much so that lobbying the Government has now resulted in a change in the UK Building Regulations (the [Domestic Heating Compliance Guide](#) - published May 2006) to require treatment of the feed water to water heaters in hard water areas to inhibit lime-scale formation. The benefits of installing a water conditioner can include:

1. Reduction in heating costs by maintaining the efficiency of water heating appliances
2. Reduced scale deposits around taps.
3. Scale that may form is softer and may be easier to remove from kettles as well as other surfaces such as shower-heads and cubicles where lime-scale might normally build-up.

### Which water conditioner is right for me?

A water conditioner is totally different from a water softener. It is generally understood that water conditioners are not completely effective in preventing

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lime-scale build-up. They reduce scale build-up by modifying the form of the scale produced making it less likely to stick to heat-exchange surfaces. Although there are claims that certain products are ineffective in comparison with other technologies, there is significant evidence that most are generally beneficial with many modern products providing a very high level of satisfaction. Unfortunately, wild claims by less scrupulous manufacturers in the past have led to some reluctance to recognise the ability of water conditioners, although the publication of field test results by authoritative bodies, and the introduction of performance warranties for some products, is increasing confidence.

Performance is dependent on initial water quality and may be influenced by the installation practice, for example, some manufacturers advise against positioning near tee-off points to household appliances as this may lessen the treatment effect. It is essential to seek advice from the manufacturer or retailer and to follow the installation instructions carefully.

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### Aqua-Nouveau comments

Water conditioners are popular as they are priced competitively (usually around £150). As the Building Regulations now make water treatment mandatory most boiler installers and plumbers tend to fit products that 'do the job', rather than give customers any choice. This has partly to do with price but also with keeping things simple from the installation point of view. Fitting a water softener, for instance, is not necessarily straightforward. This may not be the plumbers fault due to the original building design. However, a large number of plumbers do not understand water treatment as well as they should. Many gloss over the water treatment implications to keep the job as simple as possible. This tends to keep their customers in the dark about the seriousness of making the right choice of water treatment.. On the other

hand customers often leave plumbers to 'do what they have to do', rather than investigate the alternatives or call in a specialist company such as ourselves.

Our experience of water conditioners is chequered. No water conditioner will soften water and as indicated by the UKWTA the products can be viewed as being less effective in preventing lime-scale build-up. We have found that the technologies can give intermittent performance. This has been attributed to location, pipe size and water flow.

Currently, Aqua-Nouveau only use water conditioners if it is not possible to install a water softener. A water softener will always be our first choice as reliability, high performance and great financial benefits are guaranteed.



Aqua-Nouveau has had a long association with Scalewatcher. We would classify their products as being 'best buys' in the water conditioner market place