



guardians of drinking water quality  
DRINKING WATER INSPECTORATE

## Water hardness

### **What causes hard water?**

Rain water is naturally soft but once it falls on the ground and percolates through rocks it picks up natural hardness minerals, such as calcium and magnesium. Depending on the local geology the hardness of the water supply will vary. The general pattern across the UK means that water supplies are hardest in the south and become softer moving north.

### **What does it mean if I have hard water?**

Hard water causes scaling in hot water systems, kettles, electric irons and domestic appliances. Scaling of heating elements shortens their life and makes appliances less efficient. Hard water produces less lather from soap, washing up liquid and washing powders. It also leaves 'tide marks' on basins, sinks, baths and toilets and a scum on the surface of hot drinks, especially tea brewed in the cup with a teabag (due to the air and oil in the tea).

### **How can I find out if I have hard water?**

There is a map [here](#) that shows typical hardness of water supplies in England and Wales. For an accurate measurement ask your water company directly because within a generally hard water area there will be pockets of soft water and vice versa.

### **Is there a standard for the hardness of drinking water?**

There is no health based standard for the hardness of drinking water. The World Health Organisation Guidelines 2004 has identified that water with a hardness of value of 200 mg/l or higher (measured as calcium carbonate) will produce scale and soft water with a value of 100 mg/l (as calcium carbonate) or less will have a low buffering capacity and be more corrosive to pipes. Where water companies artificially soften water before putting it into supply, it is recommended that they maintain a minimum total hardness of 150 mg/l (as calcium carbonate). This is because there is some limited evidence of a relationship between water hardness and cardiovascular health which may be related to the beneficial properties of magnesium and calcium in the diet. Consumers who move home will notice the difference in the hardness, if any, between their former and current water supply in terms of the nature and degree of scale and the taste. The well known

brands of bottled water supplies tend to be moderately hard as this characteristic is important to the bright appearance and palatability of the water.

### **Should I use a water softener?**

This is a matter of personal choice. If you live in a hard water area then a softener will improve the efficiency and increase the life of domestic appliances. It will make lathering easier and reduce tide marks on sanitary ware. Some people with skin conditions, such as eczema, have reported an improvement in their condition from using soft water for washing, however in February 2011 a study involving 336 children aged between 6 months and 16 years old showed that installing a water softener for 3 months brought no additional relief for eczema sufferers. The trial – Softened Water Eczema Trial (SWET) - carried out by The University of Nottingham showed no objective difference in outcomes between the children whose homes were fitted with water softeners and those without<sup>1</sup>.

If you do install a water softener, it is very important that you make sure that it is correctly installed and you do not soften the water to the tap in your kitchen which is used for drinking and cooking. This is because most water softeners work by replacing the hardness with sodium. Too much sodium can be a problem for premature babies because their kidneys are not good at filtering it out of the blood, and for people who are on a low sodium (low salt) diet. Artificially softened water may also be aggressive to plumbing causing leaching of copper and lead.

Also when purchasing a water softener we advise that you buy it from a reputable supplier, for example, one that is a member of [British Water](#). It should be installed only by a qualified plumber who is a member of a recognised Trade Association, such as the Institute of Plumbing, taking into account the nature of the plumbing and other fittings in your home. We also advise that you put in place a maintenance contract to avoid the softener becoming a hygienic hazard.

### **Water conditioning devices**

Some devices are sold on the basis that they produce a magnetic field which reduces scaling by altering the shape of the crystals from needle like to rhomboid – which means they are less adherent to the heating elements in boilers. These devices do not soften the water. The science behind them is based on continuous water flow and they were designed originally for large industrial water systems, not for the household situation, where water tends not to flow for up to 8 hours in 24 hours (at night). If you are considering purchasing such a device it is recommended you do so only on a sale or return basis, and that you request data on performance in the home setting.

## **Jug filters claiming to reduce hardness**

Some activated carbon jug filters also contain ion exchange resin beads which alter the “temporary” hardness of water so that the filtered water has a lower tendency to form scum on the top of hot drinks like tea and they may minimise scale build up in kettles. These devices do not alter the permanent hardness of the water.

### <sup>1</sup> A Randomised Controlled Trial of Ion Exchange Water Softeners for the Treatment of Eczema in Children

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