

Hard Water Information

Here you can read about the effects of hard water and see why fitting an Eddy water descaler could bring many benefits from eliminating the destructive effects of limescale.

Introduction to Hard Water

Water is commonly classified as hard or soft depending on the type and amount of naturally occurring minerals and salts dissolved in it. The mineral content usually comprises the metal ions of calcium and magnesium (yes these are both metals!) in the form of their carbonates, calcium carbonate and magnesium carbonate but may include several other metals as well as sulphates and bicarbonates. When water has a relatively high content of dissolved minerals (solids) it is described as hard, whereas soft water has a low dissolved content.

Two common types of hardness in water are temporary hardness and permanent hardness: Temporary Hardness
The Temporary hardness of water can be eradicated the addition of lime (calcium hydroxide) or by boiling. It occurs because of dissolved calcium bicarbonate in the water. Calcium carbonate will not dissolve as easily in hot water as it does in cold water; As a result, boiling (which engenders carbonate) precipitates calcium carbonate from the solution, leaving a water that is less hard. This is what gives your kettle that lime scale coating!Permanent Hardness.

It is impossible to remove the permanent hardness of water by boiling. It occurs because of the concentration of calcium and magnesium sulphates and/or chlorides in the water. These become more soluble when there is a rise in temperature Degree of Measure.

The hardness of water is measured as milligrams per litre of calcium carbonate, e.g. 200mg/litre CaCO₃. Milligrams per litre is the same as parts per million (ppm). You may also see hardness expressed as mg/litre of calcium. These can be converted into mg/litre of CaCO₃ by multiplying the reading by 2.5.

What Makes Water Hard?

Most people have heard of acid rain produced by absorption of sulphur and nitrogen oxides by rainfall; however, the presence of pollutants like these gases is not the only source of acidity. Carbon dioxide constitutes 0.3% of the Earth's atmosphere, and is readily absorbed by water to form carbonic acid - the acid found in carbonated beverages. Therefore, all rain is acidic to some extent, and has a strong tendency to dissolve minerals and rocks with which it comes into contact. Water is a good solvent and gathers impurities easily. Pure water, which is tasteless, colorless, and odourless, is often called the universal solvent. As rain falls it becomes slightly acidic as described above. As the water travels through soil and rock, it dissolves small amounts of minerals and holds them in solution. As already mentioned, Dissolved calcium and magnesium in water are the most common causes of hard water. The level of hardness increases as the magnesium and calcium increases.

Below is British Standard 7593: 1992 as used in the UK and this categorises mains water supplies as follows:

Designation	Hardness Concentration mg/Litre (as CaCo3)
Soft	0-50
Moderately Soft	50-100
Slightly Hard	100-150
Moderately Hard	150-200
Hard	200-300
Very Hard	Over 300

Is Hard Water Bad For You?

While the effects on one's health are fairly limited Hard Water does have negative impacts on the home and industry. The mineral build-up on plumbing, and heating elements of household products affects their performance and service life. However, the calcium and magnesium in drinking water is actually beneficial to us.

Many people in the UK and other countries need to soften their water. Standard salt fed "ionic exchange" or "reverse osmosis" water softener systems remove these beneficial minerals and add potentially unhealthy sodium to the water from salt. The Eddy electronic water treatment device, however, does not remove the healthy calcium from drinking water, nor does it add any chemicals to the water.

The National Research Council proclaims that drinking hard water can partly satisfy ones calcium and magnesium dietary needs. It also states that in instances where calcium and magnesium concentrate are very high, this can be the primary magnesium and calcium contributor to the human diet.

Researchers are forever studying the relationship between the hardness of water and mortality rates as a result of cardiovascular disease. Such studies have been 'epidemiological studies,'

There are some studies which suggest a definite relationship between hard water and lower cardiovascular disease mortality. However others do not suggest a relationship. The National Research Council deems results at this time to be inconclusive.

How can you know if you have hard water?

The simplest way to ascertain if water is hard or soft is the lather/froth test. Soft water lathers easily with soap, whereas hard water does not. Toothpaste also does not froth well in hard water. More accurate methods of hardness detection use a wet titration method to determine hardness.

Any of the symptoms below can also signify the presence of hard water:

- **Furred up kettle**
- **If there is a build up of soap scum in the sink or bat**
- **rings around the bathtub**
- **If your showerhead is clogged**
- **If soaps and detergents lose their ability to clean**
- **Yellowed clothes**
- **Clogged pipes created by a pileup of minerals**
- **Increased water heating**
- **Skin infections**

Furthermore, if you'd like to find out the state of the water in an area you don't live in (maybe because you are thinking of moving there), you can find out how hard or soft the water is by contacting the water company in that particular area.

These companies are usually very co-operative, and most of them even send a free water hardness testing pack to test your own water supply.

If you are on a communal water system, you can contact the supplier for information regarding the level of hardness of the water they deliver.

Effects of Hard Water

Laundering

When you wash clothes in hard water they can often look dull & feel scratchy. The water's minerals will combine with the salts of soils. This is really hard to remove. Soil on clothes can often lead to more hard inducing minerals into the water. Laundering in hard water can reduce the life span of clothers by upto 40% . In hard water, a detergent's effectiveness is

hurt and more detergent is required.

Washing Machines

Washing Machines can also be problematic. Inside the washing machine a buildup of limescale on the heating element will cause the washing machine to fail. This can also be problematic on drums, pipes and hoses. Such buildup will cause the premature breakdown of your machine and can lead to flooding.

Did You Know?

Limescale starts building up and damaging appliances from the very first use.

In the UK, **1 in 10 irons sold is returned within 1 year.**
65% of these are due to limescale damage.

Bathing

You will notice that bathing with soap in hard water often leaves a solid scummy soap solution on the skin. This film can reduce ones ability to remove bacteria and dirt. Soap scum may also lead to irritation. It can also make your hair dull, dry and difficult to manage.

Boiler Systems and Pipework

Hard water also makes it difficult for appliances to operate effectively. Heated hard water forms a scale of calcium and magnesium minerals (limescale deposits) causing pipes to block with scale, reducing water flow and ultimately leading to pipe replacement. Limescale can increase your energy bill by upto 25%
Limescale in Solar Heating Systems
Solar heating, is particularly susceptible to limescale build up. This can be particularly irritating in swimming pools that rely on solar energy. A low cost solution is to use an eddy descaler before the pump. This will prevent and remove limescale build-up.