

# Hardness in drinking water explained



## Hardness in drinking water is related to the presence of calcium and magnesium salts normally in the form of carbonates.

Water with small quantities of these salts is known as soft water while water with relatively high levels is known as hard water. In Scotland most raw water is drawn from lochs, rivers and burns (surface sources) and tends to be soft-to-slightly-hard. In some areas, raw water is drawn from boreholes in rock or gravel aquifers and tends to have a higher level of minerals, making the water harder than surface water sources.

## This factsheet will provide you with information on:

- Regulatory limits
- Types of hardness
- Effects of hardness
- Use of scale inhibitors
- Water taste
- Use of water conditioners
- Units of measurement
- How to contact us

### 1 Regulatory limits

There are no regulatory limits for water hardness. Drinking water supplies have hardness classified in the range 10 to 500 mg/l. Scottish Water can provide hardness level information on any supply zone within Scotland and you can request this by contacting our **Customer Helpline** on 0800 0778778. Table 1 provides the classification for water hardness (see next page).

### 2 Types of hardness

Hardness does not pose a health risk, in fact calcium and magnesium in your drinking water can help ensure you get the average daily requirement for these minerals in your diet. There are two types of hardness, which depend upon the types of salts present in the water:

- **Temporary Hardness:** This is based on the total content of calcium and magnesium carbonate expressed as Calcium Carbonate or  $\text{CaCO}_3$ . This type of hardness is responsible for limescale deposits in hot water pipes and kettles. This type of hardness can be removed by boiling your water.
- **Permanent Hardness:** Permanent hardness is usually caused by the presence of calcium and magnesium sulphates and/or chlorides in the water, which become more soluble as the temperature increases. This is why this type of hardness cannot be removed by boiling. Instead, it can be removed using a water softener.





**Table 1** Drinking water hardness

Classification	As Carbonates (mg/l)	Remarks
Soft	Less than 50 mg/l	mg/l – milligram per litre also expressed as parts per million or ppm. For conversion to other units of measurements, refer to Table 2.
Moderately soft	50 to 100 mg/l	
Slightly hard	100 to 150 mg/l	
Moderately hard	150 to 200 mg/l	
Hard	200 to 300 mg/l	
Very Hard	Over 300 mg/l	

### 3 Effects of hardness

Some of the issues you may have if you have a hard water supply:

- reduced lathering of soaps
- may result in an increase in soap and shampoo consumption
- build up of scale on electric heating elements
- reduced water flow in hot water distribution pipes due to scale build up
- build up of whiteish-grey scale in kettles
- white mineral deposits may be seen on dishes and glassware
- hard water can also produce a harmless visible floating layer on the surface of cups of tea and coffee

### 4 Use of scale inhibitors

There are some chemical products available which may slow down the formation of limescaling in heating systems. These are called ‘scale inhibitors’ but they do not soften the water. Scottish Water does not provide advice on the use of these chemicals/products. However, if you do wish to use these chemicals please consult the suppliers and also read the instructions on their use.

### 5 Water taste

Soft waters tend to taste ‘fresh’ compared to hard waters as carbonate salts contribute to the taste.

### 6 Use of water conditioners

The use of water conditioners can help prevent limescale build up on surfaces. Scottish Water is unable to advise upon the use of specific water conditioners however, if you do wish to use these chemicals please consult the suppliers and also read the instructions on their use.

### 7 Units of measurement

The hardness can be expressed in different units which are mutually convertible. Mostly it is expressed as Calcium Carbonate in milligrams per litre (mg/l) or as parts per million (ppm). Another unit in which hardness can be expressed is called degrees and these can be: in English (Clark) degrees, French or German degrees. Dishwasher manufacturers use different units in the instructions for their settings. Table 2 provides the conversion factors.

**Table 2** Conversion factors

To convert CaCO <sub>3</sub> as mg/l (ppm) to	Multiplication Factor
English (Clark) degrees	0.07
French degrees	0.1
German degrees	0.056
As Calcium in mg/l	0.4



