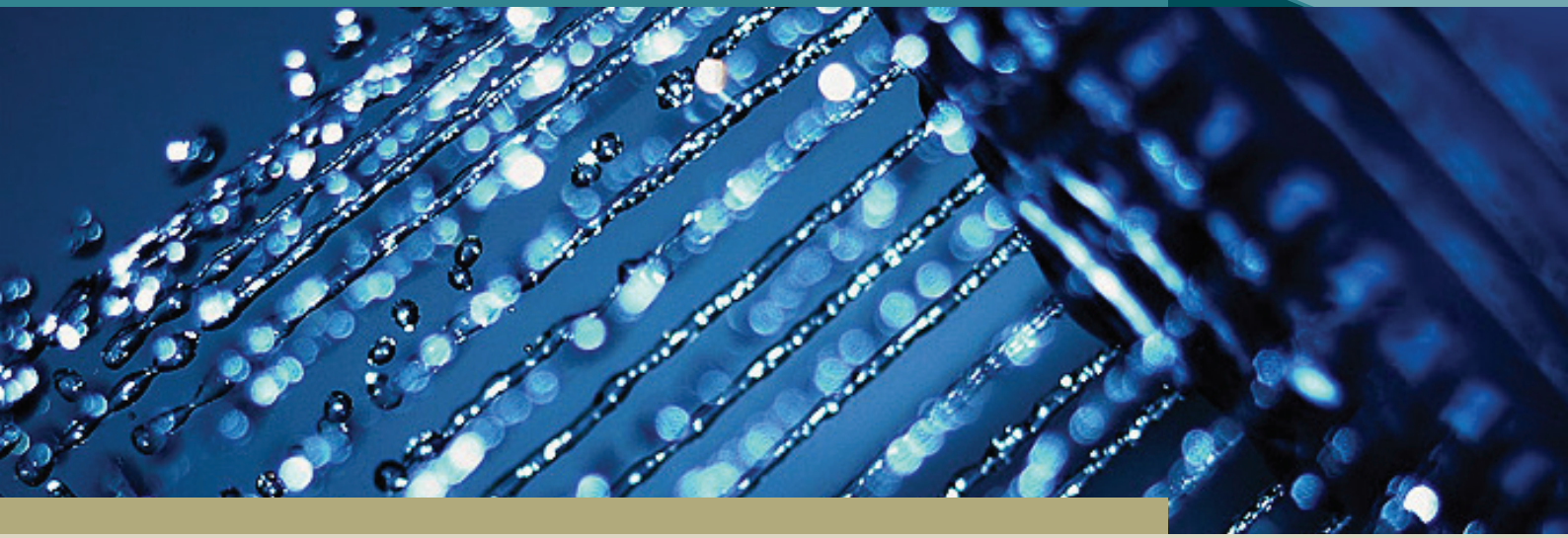
Water hardness and scaling

What is hardness?



Hard water requires more soap than soft water to obtain a lather. It can also cause scale to form on hot water pipes and fittings. Hardness is caused primarily by the presence of calcium and magnesium ions. Total hardness is the sum of the concentrations of calcium and magnesium ions expressed as a calcium carbonate equivalent.

Degrees of hardness can be described as follows:

<60 mg/L CaCO3 soft but possibly corrosive

60–200 mg/L CaCO3 good quality

200–500 mg/L CaCO3 increasing scaling problems

>500 mg/L CaCO3 severe scaling

Customer acceptance of hardness can vary considerably among communities and is generally related to the hardness that the consumer has come to expect, which in turn is due to the source of the water. Soft water may lead to greater corrosion of pipes, although this will depend on other factors such as pH, alkalinity and dissolved oxygen concentration. Total hardness above 200 mg/L may lead to excessive scaling of pipes and fittings, and cause blockage of safety relief valves in hot water systems. Total hardness in major Australian reticulated supplies ranges between about 5 mg/L and about 380 mg/L.

The Tweed supply

The Tweed tapwater has soft water with an average hardness of 55mg/L CaCO3. The Tweed water supply network consists of 690km of pipes, of which 60 per cent are cement-lined.

The system also has a number of concrete treated-water storage reservoirs. Very soft water is corrosive to these assets and to protect them a consistent hardness is required. The raw water varies in hardness with rainfall so to maintain hardness Hydrated Lime (Calcium hydroxide) is added to the water.

The optimal balance between low hardness and corrosive water and high hardness and scaling water is determined by calculating two water stability indices; the Calcium Carbonate Precipitation Potential (CCPP) and the Langelier Index (LI). If the CCPP is zero, then the water is saturated in terms of Calcium carbonate. A positive CCPP indicates that the water is over-saturated and likely to precipitate a film of predominantly CaCO3 on to pipes. If the CCPP is negative, then the water is under-saturated. A slightly negative CCPP (-2.0 to –5.0) is preferred to prevent scaling of hot water systems.

A negative LI value indicates that the water is non-scaling and a positive value shows it to be over-saturated and therefore likely to cause scaling. A slightly negative LI is preferred (i.e. –0.5 to –2.0) to reduce scaling of hot water systems.

TWEED SHIRE COUNCIL