

# Explanation of Water Hardness

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Many industrial and domestic water users are concerned about the hardness of their water. Hard water requires more soap and synthetic detergents for home laundry and washing, and contributes to scaling in boilers and industrial equipment. Hardness is caused by compounds of calcium and magnesium, and by a variety of other metals. Water is an excellent solvent and readily dissolves minerals it comes in contact with. As water moves through soil and rock, it dissolves very small amounts of minerals and holds them in solution. Calcium and magnesium dissolved in water are the two most common minerals that make water "hard."

The hardness of water is referred to by three types of measurements: grains per gallon, milligrams per liter (mg/L), or parts per million (ppm). Typically, the water produced by Needham Water is considered "slightly hard" to "moderately hard." The table below is provided as a reference.

Water Hardness Scale		
Grains Per Gallon	Milligrams Per Liter (mg/L) or Parts Per Million (ppm)	Classification
less than 1.0	less than 17.1	Soft
1.0 - 3.5	17.1 - 60	Slightly Hard
3.5 - 7.0	60 - 120	Moderately Hard
7.0 - 10.5	120 - 180	Hard
over 10.5	over 180	Very Hard

Often, when you purchase a new dishwasher or washing machine, the manufacturer has recommended settings that depend on the hardness of the water. The table below provides the historical range of "hardness" of water in the Needham Water system.

Needham Water Hardness Scale		
Grains Per Gallon	Milligrams Per Liter (mg/L) or Parts Per Million (ppm)	Classification
2.3 - 10.1	60-86	Slightly Hard to Moderately Hard

\*This range of data is taken from 2011 of Finished Water Total Hardness results.

The Environmental Protection Agency (EPA) establishes standards for drinking water which fall into two categories — Primary Standards and Secondary Standards. Primary Standards are based on health considerations and Secondary Standards are based on aesthetics such as taste, odor, color, or corrosivity. There is no Primary or Secondary standard for water hardness. In fact, the National Research Council (National Academy of Sciences) states that hard drinking water generally contributes a small amount toward total calcium and magnesium human dietary needs (National Research Council, Drinking

Water and Health, Volume 3, National Academy Press, Washington, D.C., 1980) On average, the calcium levels found in the water delivered by Needham Water could contribute 5 to 10 percent of the Recommended Daily Allowance of calcium for an adult