Water Hardness in boilers and scale formation

Since water is the key ingredient used in a boiler system, it is important to understand just exactly what is in the water you will be using. We recommend that customers have a water analysis performed so they have a true picture of what they are dealing with.

One of items that will be quantified in the analysis is the hardness. This is really the amount of mineral contamination that is found in your water. This degree of contamination can be measured by either a chemical analysis or by measuring the water's ability to conduct (or resist) an electrical current.

Hardness can be reported in one of three different expressions:

Mg/l - milligrams per liter
Ppm - parts per million
Gpg - grains per gallon

We normally work with the grains per gallon expression as it is the easiest for all to understand. Imagine if you took a pill that weighed 8 grains and dissolved it in 1 gallon of pure water. The result would be 8 grains per gallon. Simple and easy to understand, however, other like to express water hardness as mg/l or ppm. Here is a table that can help you make the conversion:

Gpg X 17.1 = ppm
Gpg X 17.1 = mg/l
Ppm X .05833 = gpg
Mg/l divided by 17.1 = gpg

Water hardness becomes an issue as soon as heat is applied in the boiler system. The most common problem is that of scale formation, a problem that will rob your system of the efficiency it was designed to deliver.

The following formula demonstrates scale formation.

$$Ca(HCO_3)_2 + Heat \rightarrow H_20 + C0_2 \uparrow (gas) + CaCO_3 \downarrow (scale)$$

To protect your boiler system, invest in an ion exchange water softener.