

# Water Softening Systems

by Eric P. Sellers, P.E., CPD  
Senior Plumbing Engineer

Hard water is found in many water supplies across the country. Hardness is the measurement of the concentration of calcium and magnesium compounds found in water. These compounds enter the water system from groundwater sources. Calcium and magnesium compounds can become separated from the water and cause scaling in equipment and piping. Scale can decrease fixture flow rates, decrease hot water heating efficiencies and lead to premature equipment failure.

Water hardness is typically measured in grains per gallon (gpg) or parts per million (ppm). One grain per gallon is equivalent to 17.1 parts per million of hardness. Buildings supplied with water having a hardness of 5 grains per gallon or more should consider the installation of a water softener to treat the incoming water supply for the building. To determine if you have hard water, contact your water company and request a water quality report or have your water tested by an independent agency.

The type of water softeners most typically installed to treat hardness are ion exchange units. These units replace the calcium and magnesium compounds found in hard water with more soluble sodium compounds which will not form scale in the piping system or equipment.

The ion exchange takes place in softener tanks which are filled with resin. The resin is charged with sodium ions through the use of a salt brine mixture of sodium chloride (NaCl). The resin has to be regularly recharged through a backwash cycle in which a new dose of sodium chloride is flushed over the resin.

If your facility uses a large amount of water or the level of hardness is high, a large amount of salt will be required for this water treatment process. Salt is typically purchased in palletized bags and the brine tank must be filled manual. If your salt usage is high, an exterior salt storage tank for bulk deliveries with an automatic fill system for the interior brine tank may be more economical.

If you need assistance in evaluating if your facility needs a water softening system, or if a bulk salt storage tank would be appropriate for your facility, please contact Eric P. Sellers, P.E. at 717-845-7654 or [eps@ba-inc.com](mailto:eps@ba-inc.com).

**Barton Associates, Inc**

**Consulting Engineers**

[www.ba-inc.com](http://www.ba-inc.com)

York | State College | Harrisburg

717-845-7654 | 814-237-2180 | 717-939-2210