WATER HEATER TECHNICAL BULLETIN

BULLETIN 44

WATER SOFTENERS

GENERAL	The use of water softeners in hard water areas and even moderately soft water areas is becoming a common occurrence. This practice has a potentially detrimental effect on the performance of the anode in the water heater which can cause a reduction in the life of the water heater. Scale caused by hard water can result in clogged pipes and reduce a water heater's recovery efficiency. Washing, bathing, and shampooing in hard water leaves a film and solid particles on the skin. The problems are caused by insoluble cations in the water. The predominant cations in water are calcium and magnesium. Water softeners work by exchanging soluble sodium ions for the insoluble calcium and magnesium ions. This process is called ion exchange and is performed by a substance called zeolite. The zeolite is precharged with sodium ions which attract the calcium and magnesium ions and exchanges them with sodium. Periodically, the softener is recharged with sodium by running salt (sodium chloride) through the zeolite resin bed.

EFFECTS	• Sodium reduces the hardness of the water, but it does not reduce the conductivity of the water. Excessive conductivity in the water will accelerate anode decomposition resulting in more rapid anode consumption. • If the resin bed of the softener is not properly rinsed after regenerating the resin, residual salt will get into the heater. This will increase the conductivity of the water and result in more rapid anode consumption. • Water softeners accelerate anode consumption because they eliminate the formation of scale in the water heater tank. Light scale formation in a water heater is desirable since it forms a barrier film on the exposed steel surfaces in the tank, such as pipe connections and weld areas. Corrosion cell tests at the Corporate Technology Center have shown steel corrosion rate drop of 33% with the formation of a thin (<1/16") film of scale after only three weeks in moderate conductivity water (17 grains hardness). By allowing a thin layer of scale to form on the tank, the steel would be protected, therefore, increasing the life of the anode.

NOTE	Customers using water softeners should expect more rapid anode consumption. Anodes should be inspected more often and replaced when nearing the end of their useful life.

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