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WATER HEATER WATER QUALITY

CEMLINE® Water Quality Guidelines for Water Heaters

Properly treating water to the water heater is fundamental to the routine maintenance of the unit allowing for a long life of the unit and the system components connected to the water heater. Any water treatment program should be managed under the supervision of a competent water treatment specialist.

Water heaters can be affected by scale formation or chemically induced corrosion with the use of poor water quality in the unit. The most commonly occurring water quality problem associated with water heaters is the formation of scale within the unit. Scale tends to form on the hottest surface, which is the u-bend heat exchanger. The formation of scale within the unit can lead to a decrease in capacity of the water heater, as scale forms on the heat exchanger surface.

Poor water quality can also lead to the formation of chemically induced corrosion of the heat exchanger or the vessel. The types of chemically induced corrosion that may be experienced are general corrosion, pitting corrosion, and stress corrosion. Chemically induced corrosion can dramatically reduce the life of the vessel or the tube bundle. Examples of general corrosion could be a uniform attack of the tube, tubesheet, or vessel reducing or thinning the material until there was a failure. Pitting corrosion would be formation of pits on the tubes, tubesheet, or shell leading to a failure of the material. Examples of stress corrosion would be stress corrosion cracking. Stress corrosion cracking is the formation of brittle cracks following the lines of stress and grain boundaries of the metal. Stress corrosion cracking can be experienced in austenitic stainless steel, such as grade 316L used in the vessel, tubes, and tubesheet of the water heater. Stress corrosion cracking is associated with chlorides in the water. The rate of incident of stress corrosion cracking rises with increased chloride concentration and temperatures. Under typical design and operating conditions, the water temperatures in a water heater are not high enough to create stress corrosion.



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Below is a list of water properties and the recommended ranges for use in Cemline Water Heaters to control corrosion and scale.

Property of Water	Range
pH	6 - 8
Total Hardness (Ca and Mg)	Less than 150 ppm
Alkalinity (CO ₃ , HCO ₃)	Less than 300 ppm
Total Dissolved Solids	Less than 50 ppm
Conductivity	Less than 1500 ppm (3000 uS/cm)
Chlorides	Less than 100 ppm
Sulfates	Less than 250 ppm
Silica	Less than 150 ppm