



INFORMATIONAL BULLETIN

PARTS & SERVICE DEPARTMENT

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TO: Manufacturers' Representative, Regional Managers, District Sales Managers, Technical Service, Customer Service, Service Agents

SUBJECT: Softened Water Impact on Water Heaters

The required temperature rise and the standard pump used with Copper Heat Exchangers is based on the presumption of typical water chemistry of 8 – 25 grains of hardness, and less than 350 ppm dissolved solids (TDS). Caution must be used when heating water softened water below 8 grains. Typically commercial water softeners reduce hardness to 0 grains which may result in long term problems in the system.

When using softened water the installer must be aware that increasing temperatures causes an increase in the speed of chemical reactions. The rate of increase of chemical reactions approximately doubles for every 25 – 30 degrees Fahrenheit rise in temperature up to about 160 degrees F. The rate of water flow governs the rate at which the dissolved oxygen (essential to corrosion) is replenished at metal surfaces. Typically the corrosion is characterized by pitting resulting from metallic hydroxide and tuberculation reaction. Metal hydroxide dissolves the metal, and tuberculation reduces the hydraulic capacity of the tubing. Since this aggressive reaction typically happens at the metal to flow interface early heat exchanger failure can be expected.

Water heaters can be used in softened water but it is imperative that careful attention be paid to the heat exchanger. Proper operation will normally require setting the water heater with a lower flow rate and higher temperature rise. The flow rates listed below are recommended starting points:

BTU Input	Delta "T" at 0 – 7 grains Hardness	Delta "T" at 8 – 25 grains Hardness
90,000	8 degrees	5 degrees
135,000	12 degrees	7 degrees
180,000	15 degrees	10 degrees
199,000	17 degrees	11 degrees
225,000	20 degrees	12 degrees
270,000	22 degrees	15 degrees
315,000	25 degrees	17 degrees
360,000	30 degrees	20 degrees
399,000	35 degrees	22 degrees
500,000	40 degrees	28 degrees

Decreasing the flow rate will reduce the erosion process, however the heat exchanger should be monitored to ensure the scale/liming process is not exacerbated. The unit should be placed on a comprehensive inspection schedule until optimum flow rates can be established. Problematic water areas may require heat exchanger inspection every two weeks. The total scale accumulation should never exceed the thickness of a piece of paper. Should scale accumulation exceed this thickness the flow rate will need to be increased. The tubes should not have a bright shiny copper look. This would indicate that the erosion process has begun and the flow rate will need to be decreased. Once the proper flow rates have been established the inspection intervals can be increased to every 30 days, once a quarter, to a bi-annual inspection.

This procedure should insure proper operation of the unit as long the water quality stays consistent.