

Corrosion Control- Blue Green Staining



Figure 1 Blue Green Staining from Copper Corrosion

Introduction

Most corrosion problems show up as blue green staining. The stain is copper deposited from the corrosion of the water piping and fixtures. The corrosion will eventually cause pinhole leaks in the water pipes.

There can be a number of causes for the corrosion. The most likely cause is low alkalinity which typically results in low pH (acidic) water. The second leading cause is high chloride content from salt water. A simple on site pH test and total dissolved solid (TDS) test can be very helpful in determining the cause.

The recommended pH range is from 6.5- 8.5. Many times pH levels of less than 7.5 can cause copper corrosion.

A TDS of more than 250 mg/L is an indication that there is salt water. Salt water is the most likely cause of elevated chlorides. The maximum contamination level (MCL) for chlorides is 250 mg/L. With Maine's typical water chemistry, a chloride content above 150mg/L can cause excessive corrosion.

pH correction

The correction of pH is commonly accomplished by using an acid neutralizing filter or a solution feed system that injects a pH correcting material.

The acid neutralizing filter is nothing more than a backwashing filter that contains ground up marble rock for media. This material has the common name of calcite

and is mostly calcium carbonate. Sometimes the calcite will be combined with a material called corrosex. Corrosex is magnesium oxide. When used in acid neutralizing filters, these materials are considered sacrificial media because they are consumed during use and need to be replaced periodically.

There are several disadvantages to acid neutralizing filters. They are –

- In the case of calcite the pH can only be elevated to a maximum of 7.2 and in most cases this will not be enough to correct the corrosion problem.
- Corrosex can raise the pH above 7.5 but will cause undesirably large fluctuations in pH.
- Both of these materials will add hardness to the water so systems using these materials should be followed by a water softener.
- They both require a professional water treatment technician to replace the dissolved media.

Solution feed systems use pumps that are paced to the flow of the water to inject a material very similar to baking soda. This injection method allows the best control of the pH. Essentially any level of pH required to resolve the corrosion problem can be maintained.

The most effective of these systems use a water meter to sense any change in flow of water. The meter produces a signal to precisely control the solution pumps rate of injection.

These systems have the following advantages –

- They provide the best control of the pH
- They do not add any hardness to the water

Chloride removal

If it is determined that there are elevated chloride concentrations, the only way to effectively remove the chloride is with reverse osmosis (RO). Since the chlorides will affect all of the plumbing and fixtures in the house, a RO that is large enough to treat the entire house supply will be required.

In addition to reducing chloride concentrations, the RO will reduce other contaminants in the water. This feature provides an added level of safety and benefit.