

DOES A CLOSED SYSTEM NEED CHEMICAL TREATMENT?

Good reasons why the answer is yes! There are several common misconceptions about closed systems. One is that closed systems are sealed off from the atmosphere and circulate the same body of fluid all the time. Therefore, they are quite stable and never need any form of chemical treatment to protect them. This is not quite true, as exemplified by automobile cooling systems which are certainly not operated with just plain water. We know what the result would be - rusty water and pretty soon, an invoice for a new water pump. The effects on a closed loop system used for any kind of heating or cooling are the same - corrosion, deterioration of components and loss of heat transfer efficiency. What causes these problems to occur? Some waters used to fill a closed loop can be acidic and contain dissolved oxygen. Low carbon steel and iron corrode rapidly under these conditions releasing small flakes of rust into the circulating stream. These particles are abrasive and tend to erode the components of the system. This can be particularly harmful in the area of pump shaft seals.

What happens after all the oxygen and acidity has been used up? Would the system become stable and corrosion cease? So-called closed loops are not truly closed. Provisions must be made to automatically compensate for any pressure changes or water losses. To accomplish this, the system will normally utilize an expansion tank (which has air inside), and relief valve, at the same time being connected to the water main via a pressure-reducing valve (PRV). The net result of this is the introduction of a small but continuous supply of acidic water containing corrosive oxygen. The problem is aggravated considerably if the system is opened for any kind of routine maintenance or component replacement. As corrosion in the loop continues, heat-transfer surfaces become coated and lose efficiency and tubes become plugged. Layers of debris lead to an effect known as under-deposit corrosion, which can cause pitting, a form of concentrated, localized corrosion. Pitting should be avoided at all costs because it leads to rapid perforation or component failure. How can you tell if system has problems? Some simple tests on the circulating water will give a very good indication of whether things are under control. Appearance- Dark brown or black water indicates a serious corrosion problem. There should be very few solid particles collecting at the bottom of the sample container. Examine the filter- See how much material is being removed. Dissolved iron and total iron tests- If the sample contains more than 1 mg/L (parts per million) iron in either of these tests, the system is corroding and needs to be brought under control as soon as possible. How can you restore control using chemical treatment?

A closed loop chemical treatment program should provide the following: pH control- Overcoming the effects of an acidic raw water supply is accomplished by a suitable pH adjustment additive. Film-forming corrosion inhibitor- Coating all internal surfaces of piping and equipment with a protective, mono-molecular film will ensure that no further attack is possible. Use a product (such as molybdate or nitrite) that is recommended for all closed systems. What else can be done to protect a closed loop system? Make sure to start with a clean system. Measure the corrosion inhibitor concentration regularly to ensure it is not being diluted. Examine the system for leaks. If leaks are suspected,

installation of an inexpensive totalizing water meter in the makeup line will provide early detection. We welcome your inquiries to arc@arcwater.com or call us at 800-832-3260.