



Sustainable Closed Loops

A Closed Loop is characterized by a system that circulates water throughout a closed system without evaporation or intentional water loss such as blowdown or bleed. Without leaks, little make-up water is needed and the system metallurgy can be protected with an initial charge of corrosion inhibitor. Closed loops are ideal for processes that require very clean, low suspended solids water or high purity water with low dissolved solids.

The most common type of closed loop is a Chilled Loop in an HVAC System or Chiller. Here the water circulates from the chiller to air handling units, fan coil units or process machines that require cooling. Fans blow air over these coils and the chilled water absorbs the heat before flowing back to the chiller. Inside the chiller, a refrigeration loop absorbs the heat from the chilled loop water across a tube and shell heat exchanger called an evaporator and then the re-cooled water repeats the cycle.

In turn, the refrigerant exchanges heat across a second tube and shell heat exchanger called a condenser. If the condenser is water cooled, the water side of the condenser contains open recirculating water which rejects heat into the air over the cooling tower. In both heat exchangers, water flows through the tubes and the refrigerant is contained in the shell side. If the condenser is air-cooled, then outside air cools the condenser and the cooling tower is eliminated.

A Heating Loop or Hot Water Boiler is a closed system where the water is heated instead of cooled. These are similar to home hot water heaters except the water is recirculated through the system. The heat source can be gas, electric or steam from a steam boiler which heats the closed loop water

across a heat exchanger. Treatment is the same as for chilled loops, but the dosages are higher. Certain hot water boilers contain aluminum metallurgy for better efficiency. Special care must be provided for these systems including inhibitors for aluminum to keep the pH between 8.0 and 8.5.

The operating efficiency of closed loops depends upon keeping these systems clean and free of corrosion. Since the water is not visible like cooling tower water, closed loops can easily be neglected. Problems can arise from the beginning if the system is not cleaned properly at start-up. And if the system is not adequately treated with an inhibitor, corrosion will be a problem. If corrosion takes place, then the by-products can form deposits in the system which will cause restricted flow, plugging, and severe under-deposit corrosion leading to tube or pipe failure. With water loss, oxygenated water will dilute the inhibitor in the system and lead to more corrosion, deposition and failure. A dirty system will also be susceptible to microbiological contamination and biofilm.

A “Sustainable” closed loop system should be clean and contain the proper level of water treatment inhibitors, undergo regular water testing and feature side-stream filtration to maintain the system at peak operating performance. Sustainable Water Treatment can help achieve these objectives by providing closed loop water analysis and evaluation, filtration, and water treatment products. These products include corrosion inhibitors, biocides, specialty cleaners and also cleaning services for online or offline cleaning. We will lend our expertise for any type of system ranging from chilled loops and chilled storage to glycol and heating loops.

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