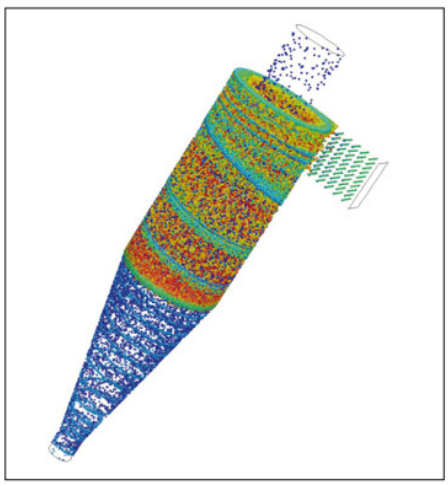
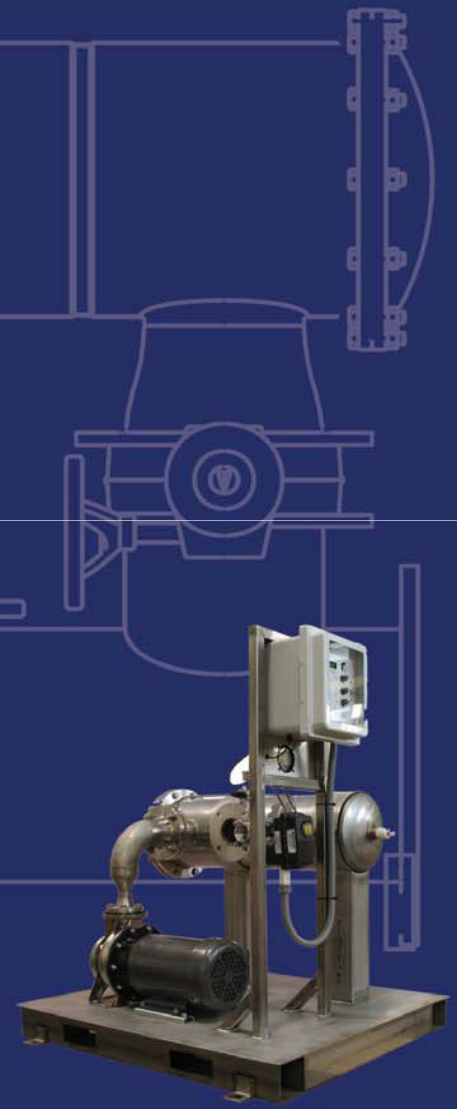
COOLING TOWER

Cooling Tower Side Stream Filtration



Side stream filtration systems reduce suspended solids and debris in the system cooling water, which leads to less fouling in the system. Decreasing suspended solids can also help reduce biological growth in the system because suspended solids are a good source of food for microbiological organisms. Decreasing biological growth in turn helps to reduce microbiologically influenced corrosion. In addition, scaling can be reduced from side stream filtration by limiting fouling and corrosion by-products which can also contribute to scale formation on the heat exchange surfaces. Effectively managing these conditions can optimize system performance, often resulting in moderate to significant energy and water savings.



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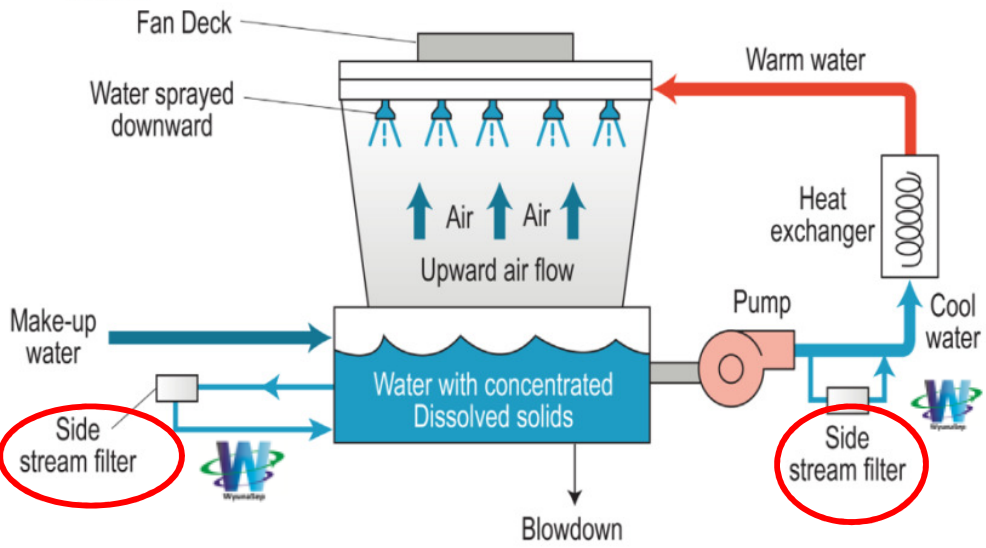


Technology Characterization

Side stream filtration systems continuously filter a portion of cooling water to remove oil,debris and particles. Filtered water is then pumped back into the main condenser line through a nozzle or re-turned to the cooling tower basin (called the sump). Figure on side shows a sim-plified cooling tower schematic, includ-ing the two example locations where side stream filtration can typically be installed. These systems remove suspended solids, oil, organics, and silt particles for a portion of the water system on a continuous basis, reducing the likelihood of fouling and biological growth, which helps to control other issues in the system such as scaling and corrosion. This improves system efficiency and often reduces the amount of water rejected from the system.

Side stream filtration increases water and energy efficiency and reduces cost, as described below

➢Reduction in water consumption: Demand for makeup water in cooling towers is decreased with an increase in the system's cycles of concentration. Essentially, higher cycles of concentration mean that water is being recirculated through the system longer before blowdown is required. Less blowdown reduces the amount of makeup water required in the system, resulting in water savings.

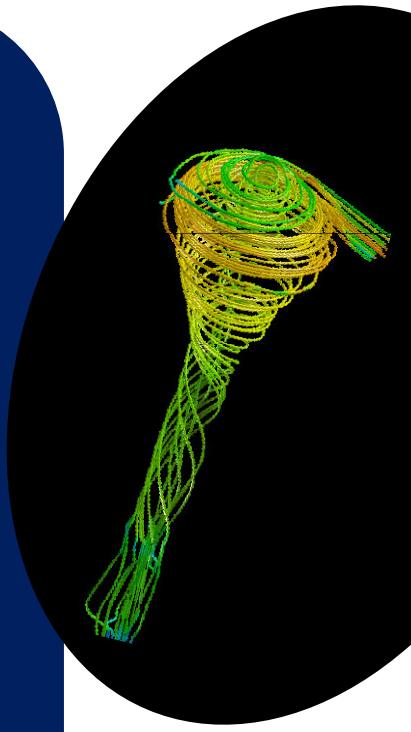
➢Reduction in energy consumption: Side stream filtration reduces the likelihood of scale and fouling on the heat exchangers. Even the smallest layer of scale or fouling on heat exchange surfaces can reduce the rate of heat exchange, forcing the system to work harder to achieve the required cooling.

➢Reduction in chemical use: A side stream filtration system can remove suspended particles, reducing the need for additional chemical treatment such as dispersants and biocides.

➢Lower maintenance cost: Traditionally, cooling towers are cleaned by draining the tower and having the sediment removed mechanically or manually from the basin or sump. Cooling systems that are cleaned via side stream filtration routinely provide longer periods of continuous operation before being taken offline for required maintenance.

➢Improvement in productivity and reduction in downtime: When a cooling system is fouled or has scale build-up, production may be slowed due to inefficient heat exchange equipment. In some cases, the cooling system and heat exchange equipment may need to be taken offline for repairs, decreasing production.

➢Control of biological growth: Biological growth control and reduction can mitigate potential health safety issues.



BENEFITS

- @50% reduction in cooling water treatment chemical costs
- Makeup water usage reduced by 15%
- Improved corrosion and scale protection
- Online deposit removal with reduced system cleanings
- Clean, clear, recirculating cooling water

SIZING

Typically, a side-stream representing about 15-20% of the total recirculated flow is adequate for sizing purposes. For example, a 100-ton cooling tower will have a total recirculating flow rate of 68.1 m3/Hr