

Specification Sheet

FlowFilt Kidney Loop Filtration System for Cooling Towers

Cooling towers & heat exchangers are used in the processes and cooling of machines in many industries and in the air conditioning of buildings etc. They are designed and made in several types and numerous sizes, water and atmospheric air being the common media of heat exchange in all of them. It is essential to maintain the water quality, which is highly affected by the atmospheric air, for the efficient operation of the cooling towers, heat exchangers, and other downstream equipment's.



Air Quality Affects Water Quality

Water quality is affected by the air quality at any particular site. The air quality at most sites in India is dusty and is the cause of serious adverse effects upon both the cooling tower as well as its longevity of service and its ability to function efficiently. Cooling towers pick up a lot of dust and other airborne particles from air, which then gets washed in by the circulating water and carried as sediments into the downstream processes.

The composition of this debris and the amount in air depends upon a number of factors:

- Proximity to exhaust outlets from industry, feed processing etc.
- Local activity such as building construction and roads.
- Pollination of conifers and deciduous trees, weeds, and grasses.
- Local insect population and life cycle.
- Surface winds.
- Falling leaves.

Once all this dirt gets into the condenser loop where does it go?

The heavier material such as grit and other inorganic particles will usually end up at the low points in the system forming "dead" areas where under-deposit corrosion can take place. Lighter material, often organic in nature, circulates more freely throughout the system and is attracted to metal parts during the periods when the condenser pump shuts off. Once on the metal surface, these particles tend to "stick" by electrostatic attraction, forming those characteristic nodules. These are prime sites for under-deposit corrosion because an electrochemical cell is set up between areas of metal that are covered by deposits and those that are not. In addition, the deposit effectively seals off the base metal from corrosion-preventing chemicals.

Once corrosion begins, the metal surface forms blisters which release oxide particles, adding suspended solids to the condenser water stream.

Filtration System Design

Filtering system can comprise of one or more methods depending on the area and location of the cooling tower site. An increasing number of installations are now utilizing cartridge filtration systems to control particulate levels and thus maintain cleanliness levels of the tower and overall water circulation system. A graded density cartridge filter removing particles in the range of 5 to 20 microns is normally used in cooling water filtration as 90% of the contamination is in this range. Typically, these systems are sized to continuously filter the cooling tower basin water inventory at a rate equivalent to about 5% of the total circulation rate over the tower. Most locations in India being dusty, the filtration rate needs to be designed more than 10% of main flow.

With side-stream filtration, a portion of the water filters continuously. The whole system is filtered every few hours. Side stream filtration works on the principle that continuous particle removal will keep the system clean. The filtration goal is not to make drinking water but to remove the fine dirt, dust, smoke, and organic/ inorganic particles that collect in water.

The most effective filter system for cooling towers & process water is a permanent medium unit, one that requires little attention & maintenance. The filter medium must be finer than 20 microns to trap the average air borne contaminant. Things to look for is that filter systems are simple, compact, and easy to operate. Also important are filter down to 20 microns providing filtration & a short automatic or manual back flush cycle.

Typically, a side stream representing about 10 to 15% of the total received water is adequate for sizing purpose. A system to handle flows of 200-400 lpm would be sufficient for cleaning the entire capacity of the tower once every few hours. The filter cartridges can be easily cleaned by backwash mechanism which can be automatic or manual depending upon the need & cost. A suggested system having 30" long 30 cartridges with 3 HP centrifugal pump is shown in the figure next page.

Advantages of a Filter in an open system

- Keeps the system clean.
- Reduces biocide requirements.
- Prolongs the life of mechanical equipment.
- Provides a warning of sudden system disruptions.
- Reduces downtime.
- Reduces maintenance and energy costs.
- Reduces corrosion.
- Reduces erosion of pump parts and equipment.
- Maintains heat-transfer efficiency.