Miller-Leaman Turbo-Disc Filter vs. Sand Filters

When evaluating sand filters vs. Miller-Leaman Turbo-Disc filters, please consider the following important points:

Back-flush Water Consumption

- Sand filters, by design, have a large amount of surface area and depth. This provides for good filtration performance, but requires a tremendous amount of back-flush water. In order to accomplish effective back-flushing, the entire sand bed must be "fluidized" or lifted and mixed thoroughly to clean the collected contaminants from the sand. This requires a large volume of water for an extended period of time.

- Sand filters typically back-flush at the rated full flow for approximately 3 to 8 minutes. For example, a sand filter rated for a flow of 300 gpm will consume 300 gallons per minute for 3 to 8 minutes. ***This means the sand filter will use as much as 900 - 2400 gallons of water per back-flush!***

- This high volume of water can have costly and complex consequences:

    - If chemical treatment is used, costly chemicals are being flushed down the drain with each back-flush.

    - Some installations using floor drains cannot accommodate the back-flush volume and often require a "holding tank" to store back-flush water until it is slowly drained.

    - If sewer charges are applicable, this added cost for the back-flush water must be considered.

- Our Turbo-Disc filter back-flushes at a rate of 45 gpm per pod for 15 to 20 seconds***. A 3-pod Turbo-Disc system (300 gpm) would use only 30 – 45 gallons of water per back-flush!*** Compare that to the sand filter discussed above. Assuming one back-flush every 8 hours, ***this could result in an annual water savings of over 1 million gallons!***

- ***The patented Turbo-Disc design makes this possible:***

    - The inlet turbo blades create a "spinning" action during filtration mode, which causes the water to spiral around the disc stack. Centrifugal force slings the heavier particles away from the filtration discs. This prevents the larger particles from plugging the discs and extends the interval between back-flushes.

    - At the start of back-flush, our air override feature uses compressed air to rapidly evacuate the filter pod prior to back-flush. The resulting empty chamber allows for a more aggressive, high velocity back-flush as the discs are violently scrubbed with high pressure, filtered water.

    - During back-flush, the disc cap, which compresses the disc stack during filtration mode, lifts; decompressing the discs. The back-flush spray nozzles, molded into the frame which supports the disc stack, spray high pressure, filtered water uniformly across and between the discs. The nozzles are also oriented to spray water in a tangential direction across the discs. This causes the discs to spin rapidly during back-flush, improving the efficiency of the back-flush.

- The grooves molded into each disc are tapered toward the inside diameter of the disc. This means the space between grooves grows smaller from the outside diameter towards the inside diameter of the disc (in the direction of filtration flow). During filtration, particles are trapped in these grooves throughout the depth of the filter. During back-flush, the spinning action of the discs in combination with the water spray releases the particles from the disc stack and flushes them out to drain.

- When the back-flush cycle is complete (typically 15-20 seconds), the disc cap compresses the disc stack and normal filtration is resumed.

- In addition, our proprietary Maxim controller offers the flexibility to adjust and control the back-flush cycle to optimize performance and minimize water consumption. Back-flush is initiated by a timed interval or pressure differential across the filter (whichever comes first). By adjusting these settings, as well as the length of back-flush, filter operation can be matched to the specific conditions of the application, optimizing filter performance and minimizing back-flush water consumption.

Filtration Performance

- Sand filters, due to the large volume of media (sand), have high surface area and a great deal of depth for filtration. This can provide for filtration of particles down to 10 microns in size. However, this level of filtration comes at a significant cost when considering the entire scope of the application. Back-flush water requirements, maintenance, installation footprint, and drainage issues can negate any gains in filter performance.

- Our Turbo-Disc filter, like the sand filter, is a three dimensional, "depth" type filter. This means that as particulate accumulates during filtration mode, a "caking" effect takes place across the disc stack. ***This "caking" effect results in filtration of very small particles and ultimately, filtration levels approaching that of a sand filter.***

- The discs used in our system are available in several micron ratings (200, 130, 100 and 50 microns). Although these ratings reflect the effective "pore size" within the disc stack, it can be somewhat misleading when considering actual filter performance. The three dimensional nature of this filter and the "caking effect" described above result in filtration levels well below the stated micron rating of the discs. A water test we conducted at an installation provided results showing that the average particle size downstream of a Turbo-Disc Filter with 50 micron discs was less than 8 microns!

Maintenance

- Proper maintenance of a sand filter includes replacing the sand media periodically. This requires adequate space for draining, removing and replacing the sand. This can be a labor intensive, time consuming, and nasty job.

- ***Our Turbo-Disc filter is designed to be maintained with no special tools***. In fact, you can inspect and replace the disc stack and o-rings by hand in just a few minutes. With proper operation, the Turbo-Disc should require only annual or bi-annual inspection and/or replacement of a few o-rings.

- The polypropylene discs are suitable for organic and non-organic contaminants and should last indefinitely. Filter pods are constructed of polyamide (plastic) and manifolds, piping and support skid are all stainless steel for long service life and corrosion resistance.

Installation / Footprint

- Due to the large volume of sand, the typical sand filter utilizes a large, spherical vessel containing flow distribution piping, back-flush piping, and supports for the media bed. With the associated valves and piping included, ***the footprint for a sand filter is much larger than an equivalently sized Turbo-Disc system***. This can become a significant issue for mechanical room or rooftop installations.

- Overall dimensions for a 3-pod Turbo-Disc system (300 gpm) are 38" W X 52 1/4" L X 70 5/8" H

- Our systems are also constructed with v-band clamps for the filter pods and Victaulic couplings on piping and manifolds. The system can be easily disassembled and re-assembled if required for installation in restricted space locations.

- Our skids are self-contained, "turn-key" systems and only require inlet and outlet water connections and single point electrical connection to our controller.

Summary

- The entire scope of the application should be considered when evaluating side-stream filtration of cooling tower water. The challenge is to balance effective removal of solid contaminants, minimize operating costs (back-flush water consumption), reduce maintenance, simplify installation and ensure automatic, trouble-free operation.

- The "open loop" nature of a cooling tower results in a dynamic filtration challenge where the contamination levels are continuously changing due to many factors. Location, seasonal changes, hours of operation, environmental conditions and many other factors influence the type and quantity of contaminants that will be found in the water.

- Filtration of cooling tower water is essentially an exercise of *"controlling"* contamination levels to ensure proper operation of system components and prevent unnecessary maintenance and repairs. This does not mean *"elimination"* of all contaminants, but rather an *"optimization"* of contamination levels to ensure proper operation with minimum cost.

- We believe the Miller-Leaman Turbo-Disc filter offers the best solution for cooling tower water filtration. The Turbo-Disc provides the following benefits resulting in efficient, cost effective and trouble-free operation:

    - Automatic operation
    - Lowest back-flush water consumption
    - Easy operation and maintenance
    - Small installation footprint
    - Quality construction with superior materials

When evaluating the choices for cooling tower water filtration, consider Miller Leaman …

"Pure Filtration Solutions"