



Water Filter Systems

INSTALLATION STYLES

The second most important determinant to the effectiveness of filtration — after appropriate sizing of the filter — is the choice of installation style.

There are five basic installation styles. Three styles are common for open-loop cooling systems with cooling towers: independent sidestream, slipstream from suction side, and slipstream from discharge side. The other two styles are; loop-the-pump, common on closed loops; and in-line, for full flow applications. This paper focuses on the three styles common to open-loop cooling systems.

First, let's be very precise in our definitions.

- **Independent sidestream** means a filter system which draws water from and returns it to a reservoir of water in the cooling loop, *completely independent* of the cooling water recirculation system. Usually, that reservoir of water is the basin of the cooling tower; sometimes it is a chilled water storage reservoir in the cooling loop.
- **Slipstream** (often called a sidestream by others, but not independent) means a filter which is installed pipe-to-pipe on the recirculation piping system, "slipping" a portion of the recirculation flow through the filter. Depending on the points of connection to the recirculation piping, the **slipstream** will be under the influence of either the discharge side or the suction side of the condenser water recirculation pump.

The basic idea behind **independent sidestream** installation is that the basin of the cooling tower (or a chilled water reservoir) is the area of lowest velocity and lowest turbulence in the recirculation system. Solids introduced into the water recirculation system at the cooling tower will tend to settle out in the area of lowest velocity/lowest turbulence. Therefore, this area is the easiest and most effective place to influence the movement of suspended solids to the filter for removal. With the addition of a well-conceived sweeper piping system returning filtered water into the basin, it is possible to create the secondary benefit of a sweeping action across the basin floor which moves solids that have "settled out" toward a filter suction header for removal, before those solids enter the recirculation piping. Bottom line, if solids don't get to the filter, they don't get removed!

The **slipstream** installation style suggests that solids entrained in recirculation flow — flowing at 10 to 20 times the filter flow rate, through pipe 3 to 4 times the diameter of the filter piping — can be as effectively attracted to the filter for removal as when the filter is installed on an independent sidestream. This defies physics and is simply not possible. For instance, solids entrained in recirculation flow of 1,000 gpm in an 8" line are not very likely to be attracted to a 100 gpm filter connected by 2" pipe. Bottom line, if solids don't get to the filter, they don't get removed!

The motivations Tower-Flo commonly hears for the **slipstream** installation style are either: 1) to place the filter system indoors instead of outdoors near the cooling tower; or 2), to avoid having the additional operating cost of the pump on the filter system. First, all **Tower-Flo**® Water Filter Systems are suitable for outdoor installation (some winter ice protection may be required for site specific conditions). Second, the slipstream style of installation does not eliminate the need for some mechanism to cause flow to and through the filter. There must be either a pump, a modulating throttling valve in the recirculation piping (which will add head and reduce flow), or pipe-to-pipe connections from high pressure influent to low pressure effluent to cause flow. However, none of these mechanisms for creating flow do anything to solve the fundamental effectiveness shortcomings of the slipstream installation style. Bottom line, if solids don't get to the filter, they don't get removed!

Slipstream installation styles present engineering issues that effect the cost of the filter system. Most notably:

- the filter vessel must be designed and rated to the operating pressure of the recirculation system, plus the pressure boost produced by filter's pump;
- provisions must be made for flow control on backwash to waste piping;

Bottom line, slipstream installation style makes the filter system more expensive, while making it significantly less effective than independent sidestream installation. Why pay more for less?!

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