Automatic Strainers

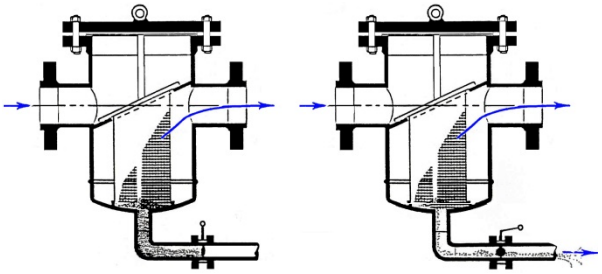
Differences between backwashing and mechanically cleaned designs

By: Chris Pasquali, CEO Factory Direct Pipeline Products, Inc.

Automatic strainers and filter systems support continuous flow rate applications by reducing or eliminating personnel that would otherwise be required to manually operate duplex strainers. The styles described below are the most common types used for industrial applications and after reading this article you should have a better understanding of which style would work best for your application.

Flushing Strainers

This type of strainer is a modification of a standard basket strainer having a drain valve at the bottom of the element chamber, which can be manually or remotely actuated. Opening the drain valve causes a "toilet bowl effect" of flushing retained solids out the drain, thus this works best with non-deformable solids and for lower solids concentrations. Since the flow is not reversed through the element, deformable and fibrous solids have a tendency to remain embedded and will require manual cleaning at some point. This is a very inexpensive design and typically shipments can be made within 2 weeks or less.

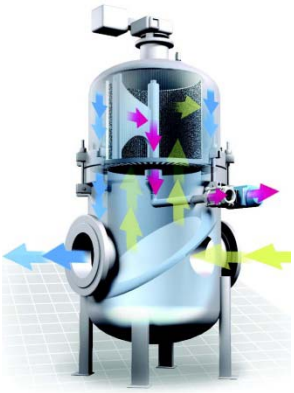


Backwashing Strainers and Filters

Automatic strainers and filter systems are designed to minimize any interaction with personnel and there are many benefits. Elimination of physical lifting of heavy (filled) strainer elements, exposure to cleaning chemicals and the physical scrubbing itself are all aspects which reduce labor hours required to keep the system operating continuously.

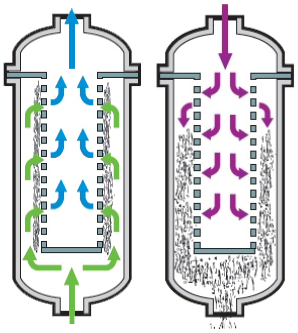
Automatic systems are generally limited to particle concentrations of ≤200 PPM and require either electricity or instrument quality compressed air to operate. Compared to duplex strainers, automatic strainers typically cost the same or less for pipelines >6".

Backwashing refers to the temporary reversal of flow through one or more filtration elements. During normal operation, large particles either become stuck against the element surface or fall to the bottom of the vessel. The particle size allowed to pass through to the outlet depends upon the opening size of the element.



Backwashing occurs when a drain valve is opened such that the differential pressure between atmospheric and the system pressure causes reversal of flow across the element, dislodging particles to a common drain. Unlike the aforementioned "flushing strainer", the reversal of flow through the element is concentrated by the system design. The Eaton model 2596 illustrated above is typical for high flow water systems common in power plants, steel mills and paper mills. These have a hollow nozzle arm, which has the same length as the element, and this arm slowly rotates across the surface of the element, amplifying the differential pressure and reversal of flow effect; the particles are essentially vacuumed off the element.

Tubular backwashing designs are made for finer particle retention and rely solely upon the differential pressure for element cleaning. The elements are specifically designed to evenly distribute reversed flow to ensure efficient element cleaning.



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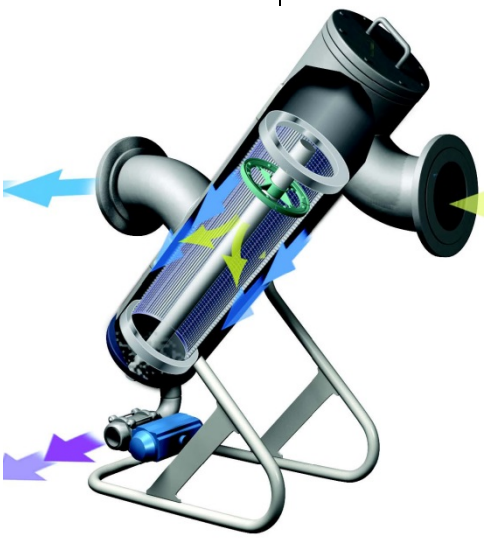
Backwashing systems are most commonly used for water applications because the backwashing procedure may require up to 5% of the system flow for a few minutes each time backwashing occurs. Therefore, your process needs to tolerate a temporary reduction in flow or the pump needs to be capable of delivering additional flow during the backwashing process.

Backwashing strainers function most efficiently when the system pressure is ≥30 PSI as that equates to a differential pressure of about 15 PSI (because you are discharging to atmospheric pressure).

The backwashing function can be initiated by timer, differential pressure or manually with the push of a button.

Mechanically Cleaned Elements

As with simplex basket strainers, particulate enters into a cylindrical, tube shaped element, having no bottom or top. The bottom end of the vessel is where the drain port is located and thus large/heavy particles will naturally fall to the drain or purge area of the vessel. The particles too large to pass through the element become stuck to the surface and perhaps some are wedged into the openings.



Cleaning occurs when a spring-loaded disc traverses the element interior. The disc is comprised of four sections; spring loading ensures a constant pressure is exerted to the element surface. The disc material, which is available in UHMWPE, PTFE and PVDF, pushes the retained particles downwards to the purge chamber. The user can adjust the frequency of strokes. An advantage of this style is that frequent strokes help ensure a consistent differential pressure, minimizing pressure spikes and changes in flow rate.

The bottom of the vessel, the "purge chamber", is shaped to increase purging efficiency. An automated valve opens; the system backpressure pushes the fluid and accumulated particles through the valve prior to closing. The entire cycle lasts only a few seconds. The frequency of purging is also user settable.

Mechanically cleaned systems provide very efficient performance for applications which have a continuous and predictable solids loading characteristic.

Loss of process fluid is minimized, making this design well suited for non-water fluids, which either have value or are more expensive to dispose. Mechanically cleaned elements are excellent for viscous fluids such as plastisol.

Designs are available to operate the stroking either pneumatically or electrically and some designs are self-contained, meaning there is no penetration through the chamber cover to actuate the stroke.

Just about any filtration application can be automated; the design that is best for you depends upon the requirements of your application. Our training and experience enables us to gather the right information and guide you to the best configuration. Additional information describing our automatic strainers is online at http://www.automaticstrainers.com.

Chris Pasquali has been trained by Hayward Flow Control and Eaton Hydraulics Filtration Division, having provided sales and engineering support for these companies since 2001.