Design and Applications for Flushing Strainers

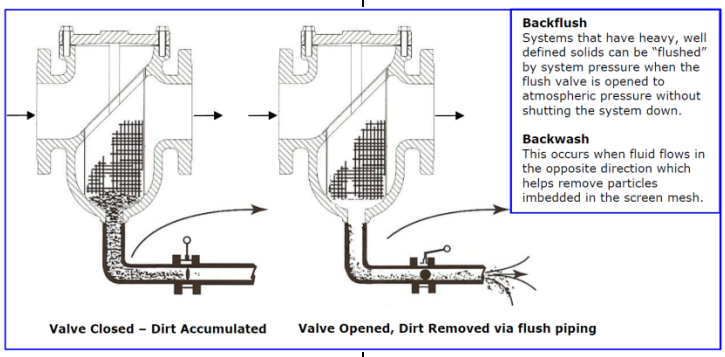
Cost Effective Alternative to Expensive Automatic Strainers

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

Our previous article provided guidelines to determining when a strainer or filter element should be cleaned or replaced. What about filtration systems that clean themselves? As described in our article "Differences Between Backwashing and Mechanically Cleaned Automatic Strainer Designs", there are three styles of self-cleaning filter designs, those which use a mechanical method for removing retained particulate, designs which rely on change in flow path to backwash the filter element and simplistic designs which "flush" retained particulate from the strainer. In this article, we describe the design and typical applications for what is often the least expensive "automatic" strainer design, the Flushing Strainer.

A flushing strainer is a modification of a standard simplex basket strainer; whereas usually the strainer basket has a solid bottom to enable manual removal from the strainer body, a flushing strainer has a bottomless basket, so it actually looks more like an open-ended Y strainer element with a handle and sealing ring at one end.

The liquid flow path through a strainer basket is "over the top", meaning the flow pours right into the top of the basket and passes through the circumference (sides) to a common outlet port. Particulate larger than the element openings fall to the bottom, held against the interior by the inlet pressure, or lodged into the element openings.



Opening the drain valve causes the retained particulate to flush from the strainer basket as liquid will take the path of least resistance. Once the drain valve opens, a swirling vortex forms, sweeping particulate held against the element and material accumulated at the bottom of the basket chamber through the drain valve.

The flushing action itself is quick, usually only a few seconds, minimizing fluid loss associated with element cleaning. In our article "*When Should You Clean or Replace Your Strainer/Filter Element?*" we provide some guidelines for determining when your strainer basket should be flushed.

Drain valves can be manual, pneumatic or electrically actuated and usually are full port ball valves because they have an unobstructed port whereas butterfly valves have a disc within the flow stream. Our article "Comparison of a Ball Valve to a Butterfly Valve" provides guidelines to which valve is most applicable to your application. Our company normally recommends a valve design based upon your applications' specifications.

Body: Basket Strainer vs Flushing Strainer

It is not just the element that is different; you cannot simply cut out the bottom of your strainer basket and expect to "convert" your strainer into a flushing strainer.

The basket chamber for standard simplex basket strainers is slightly longer than the actual strainer basket body. This ensures a positive seal between the basket ring and strainer body. If you were to only cut out the bottom of the strainer basket you would lose your element retention because that would become the path of least resistance.

Flushing strainer bodies need to have elements that seal to the bottom of the basket chamber to ensure retention of entrapped particulate.

Custom fabricated simplex strainers can easily accommodate such a modification, although fabricated strainers generally cost more and have a longer lead-time. Modifying a cast strainer design significantly reduces both cost and lead-time.

Welding a sealing ring of sufficient height into the bottom of the strainer basket chamber enables the open end of the strainer basket to "seal" with the strainer body. Such a modification is feasible for cast steel and stainless steel basket strainers.

Cast vs. Fabricated

The major advantage of the flushing strainer design is its simplicity and thus this is usually the least costly method of automating the cleaning of your straining element.

Cast strainers are typically brought into inventory in large quantities based upon foundry casting "pours", therefore the lead time required is often only 1-2 weeks to allow for basket chamber and element modification. Cast strainers are significantly less expensive because they are mass-produced and usually in countries like China where the labor cost is very low.

Fabricated strainers provide some added flexibility in terms of material of construction, the number/type/position of nozzles and straining ratio. Many applications require an ASME Code Stamp, special NDT, NDE and coating procedures and these can be accommodated with a fabricated design.

Y Strainer vs Flushing Strainer

Y strainers are the "original" flushing strainer design; invented for steam systems to protect equipment downstream from rust and pipe scale. The primary difference between a Y strainer and flushing basket strainer is the straining ratio; whereas a Y strainer typically has an open area ratio of 1:1, a basket strainer can provide a straining ratio of 4:1 or greater.

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Limitations of Flushing Strainers

They provide a comparatively inexpensive method of cleaning a strainer element without exposing personnel to the process fluid, promoting safety and reduction in labor. However, there are notable limitations compared to automated strainers having a backwashing or mechanical cleaning method.

The design of a flushing strainer is inherently that of a basket strainer although with a bottomless basket there are now two sealing points for the strainer basket. These sealing points are typically metal-to-metal, limiting the effective retention to the ≤ 150 µm range (as fine as 100 mesh).

Unlike mechanical and backwashing designs, flushing strainers do not reverse the flow through the element, therefore material lodged within the perforation or mesh will likely remain after flushing. Flushing strainers will require periodic manual cleaning of the element.

Flushing strainers are dependent upon the systems inlet pressure for efficient flushing of the strainer element, thus they are not compatible as pump suction strainers unless the inlet pressure into the strainer is positive.

Whereas flushing strainers are simplistic, consisting of a strainer and valve, backwashing and mechanically cleaned strainers/filters are an engineered system; they include pre-engineered control panels and PLCs having a scope of supply including differential pressure switches and timers.

Flushing strainers can become clogged-up; if sufficient large and deformable material accumulates within the element it could blind-over the drain (flushing) port, which requires physically accessing the basket chamber to rectify.

Application Characteristics for Flushing Strainers

Flushing strainers can replace Y strainers installed in horizontal sections of pipeline to decrease the frequency of flushing by as much as 80%.

Flushing strainers work well for characteristically hard particulate such as rust, pipe scale and other non-deformable materials because organic and deformable materials are more likely to imbed into the basket perforations or mesh.

Personnel are protected from interaction with hazardous fluids, whether an extreme temperature or chemically aggressive fluids, by reducing the frequency of physical basket cleaning.

Remote applications in related to the mining industry and mobile equipment benefit from manual operation and higher straining ratios than Y strainers provide.

The next time you have a strainer application reach out to us using one of our special web based inquiry forms, send an email or call our office; we will put our experience to work for you!

Visit us at https://fdpp.com and let us know how we can assist you with your filtration application!

Chris Pasquali has provided sales and engineering support for industrial filtration applications since 1991