Strainers Vs. Filters

Terminology and Design Considerations to Better Define Your Requirements

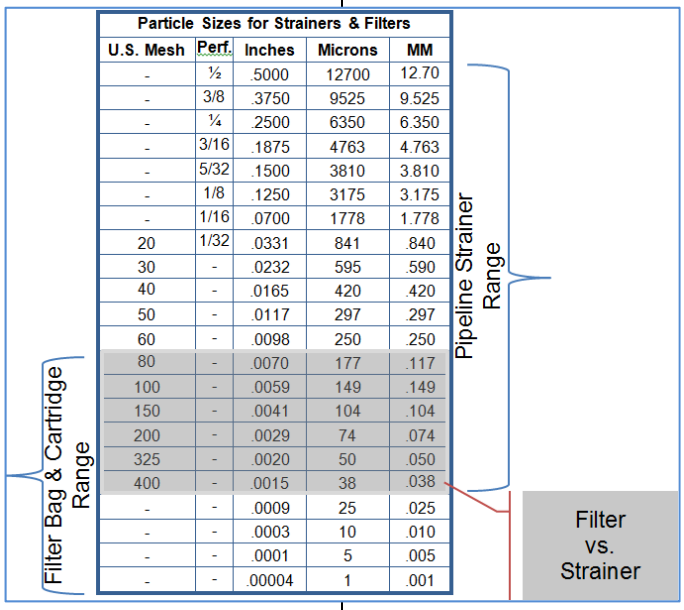
By: Chris Pasquali, CEO Factory Direct Pipeline Products, Inc.

A general definition for industrial filtration is the separation of solids from fluids (which can be a liquid or gas) to enhance the downstream process in some way.

Most applications are readily identifiable as either having retention requirements of "coarse" (strainer) or "fine" (filter), however there is a "gray area" of overlap where either can be used. This article identifies criteria to guide your selection for those applications.

Determine the Particle Size to Retain

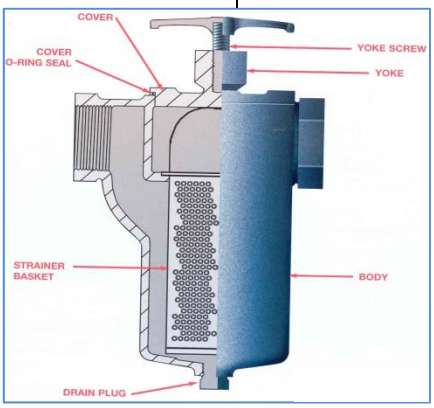
This will be defined by your process and the equipment downstream; we typically suggest retaining a particle size equivalent to 33% to 50% of the maximum allowable particle size. The reasoning behind this practice is that sometimes multiple small particles will collide together and form a larger particle, (especially in areas of low velocity within the pipeline) thus targeting a smaller size particle helps minimize that occurrence. Particle characteristics such as shape, deformability and volume as a percentage of the fluid also need to be considered. The more conservative you are by using a finer retention increases the complexity (and thus cost) of the housing and element.



Straining or Filtering?

Most pipeline strainers can be supplied with mesh lined perforated screens for particle size retentions as low as 400 mesh (approximately 38 microns); like many things in life, "just because you can, doesn't mean you should"!

Strainers are designed for relatively "large" particle sizes and we adhere to the guideline that strainers are best used for particles you can see with your eyes, which tends to be particles larger than 50 microns. However, since filters are also used within this range, we start looking at filters for retaining particles finer than 150 microns because with finer retention there is often a requirement for increased efficiency.



Nominal vs Absolute Retention

All filtration retentions are considered nominal unless otherwise specified and it infers *approximate* whereas absolute infers 99% or greater efficiency for the specified retention.

Nominal vs. Absolute is probably the most misunderstood aspect of industrial filtration. The design of the vessel housing and the element used for separation determine the overall efficiency. "Nominally efficient" alludes to the fact that some larger particles are likely to bypass the system due to the way the element is designed or seated within the vessel.

The element design for most pipeline strainers do not have a sealing capability to ensure retentions much lower than 100 mesh (approximately 150 microns), so if your process is so critical that you need to retain particles finer than 100 mesh, you should consider a "filter".

Even with filter cartridges and filter bags, which provide *depth filtration*, nominal rated media relies on a "cake" of particulate to increase the retention efficiency. Thus, there are both media and vessel design characteristics contributing to the overall retention efficiency.

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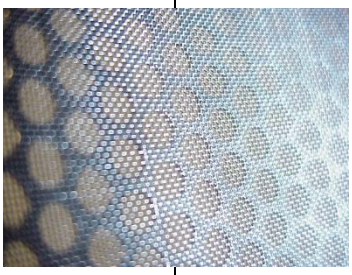
Filter designs employ elastomeric or non-alloy crush seals to prevent element bypass; pipeline strainers normally rely on a metal-to-metal seal between element and housing.

Both strainers and filters can be provided in duplex configurations, which are used for applications in which the process cannot be interrupted for cleaning or replacement of the element.

The terminologies of "absolute" and "nominal" retentions are described in detail in our Filtration Efficiency Article.

Filtration Ratio

The ratio of the inlet pipe area to the element surface area is an important characteristic to consider, especially for applications requiring retention of particles within the 100 and 200 micron range in which either a pipeline strainer or filter could be employed. It is tempting to utilize a pipeline strainer because they typically cost less than a filter due to the simplicity of their design.



Pipeline strainers retain finer particles with a multi-layer element design, normally an underlying perforated substrate having wire cloth (mesh) welded to its surface. The underlying substrate supports the mesh and particle accumulation is mostly limited to the surface of the element.

Filters utilizing a cartridge (alloy or non-alloy) or cloth material not only provide surface filtration, but also provide depth filtration. These engineered materials have layers which offer progressively finer retention, thus increasing both efficiency and solids holding.

Situations where the fluid normally has few solids and the filtration device is protecting the downstream process from an upset condition, a pipeline strainer might be acceptable even for particles <100 microns.

When there is an expectation of continuous particle removal or if a few larger particles bypassing the filtration device would cause a problem downstream, then the complexity of a filter is justified.

Commonalities of Strainers and Filters

The difference between the two terms is really the underlying complexity of the design, with filters tending to be more complex and thus more expensive.

Likewise, both strainers and filters can be automated to "self-clean". This is sometimes preferable to duplexed designs when personnel are not available to clean or replace clogged elements. Designs exist to minimize differential pressure fluctuation as well as to minimize loss of process fluid.

Filtration experts have visited and worked with engineers, plant managers and production personnel from various industries and can often visualize the most appropriate design for your specific application given some basic design criteria.

Required Information

The following information is required to help ensure the most appropriate design is selected:

- Common fluid name
- Particle size to remove
- Estimated concentration, PPM
- Describe the solids to be removed
- Specify the maximum flow rate, pressure and fluid temperature.
- Advise the inlet and outlet pipeline size, connections and material of construction.
- Can your process be interrupted for element cleaning or replacement?
- Perhaps most importantly, an overview of your application including the problem you are trying to solve and if you have any special requirements which might include special coatings, documentation or NDT procedures.

Our goal is to help you solve your application in the most cost effective and reliable manner possible, let our 25+ years of experience go to work for you today!

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