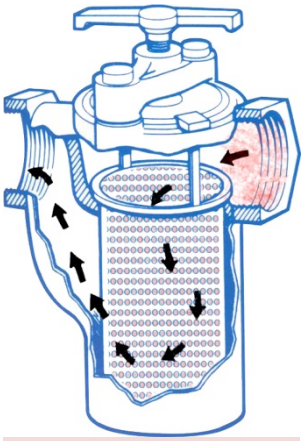
How to Compare and Select Cast Simplex Strainers

Avoid the pitfalls related to relying on only size and cost

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

Cast vs. Fabricated Simplex Basket Strainers

Cast and molded simplex strainers have a fixed ratio of cross-sectional inlet opening to basket-surface area whereas custom fabricated simplex basket strainers can be designed for higher straining ratios. The open area ratio (OAR) takes into account the open area of the basket for which the fluid passes through with mesh lined baskets having less open area than perforated baskets. You can use the OAR to quickly identify strainer designs which might require less frequent basket cleaning.



Open Area Ratio (OAR) is ratio of inlet area to the total area of all openings in basket

Cast strainers are mass-produced in foundries located in other countries where environmental regulations are less stringent and both material and labor costs are minimal, causing them to be significantly less expensive than custom fabricated basket strainers. Often cast simplex basket strainers weigh 80% or less than comparable fabricated simplex basket strainers because the molds used by foundries enable thinner wall thicknesses; this characteristic also reduces material cost and is an advantageous feature when installed on portable equipment.

Foundry tooling for cast strainers is expensive to design, maintain and modify which is why fabricated strainers are used when custom nozzle orientations, additional ports/connections, a thicker walled design, higher straining ratios or other such customizations are required.

Cast Simplex Basket Strainer Designs:
Internal Geometry and Ergonomic Features

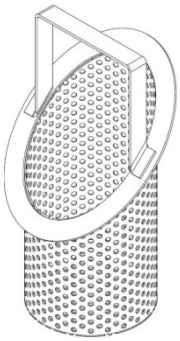
When a cast strainer is appropriate for an application it is commonplace to simply search for a strainer size equal to the pipeline it will be installed, matching the strainer material to that of the pipeline; often cost and availability become the primary selection criteria. Have you ever wondered "Why is there such a variation in cast simplex basket strainer pricing for a given size and material?"

Several Aspects to Compare Before Deciding

The basket design is a process related aspect to consider because it directly relates to the efficiency of the strainer design.

It is advantageous for some applications to have a strainer basket as large as possible for a given pipeline size because it maximizes the surface area available for particle retention, increasing the interval between basket cleaning. The importance of that aspect varies with each application; if your application is a batch process then the strainer basket only needs to be of sufficient size to make it through that batch at an acceptable differential pressure. If there is potential for an upset condition and lots of particulate or there is a desire to minimize plant personnel exposure to the process fluid, a larger strainer basket is beneficial.

Some strainer baskets have a slanted entrance ring and others are tubular with flow passing over the "top"; whether there is an advantage to either style is application specific. If your pipeline velocity and particle load is low or your fluid is shear sensitive, a slanted basket design might offer better performance.



The design of a cast simplex strainer dictates the design of the strainer basket. You can compare simplex basket strainer designs without comparing the surface areas of baskets by referring to the strainers flow coefficient value (Cv).

The Cv is a measurement of the flow resistance for a particular strainer design. When comparing simplex basket strainer designs, a higher Cv value indicates it is capable of handling a given flow rate with less restriction (pressure drop). The difference in Cv values is a reflection of the internal finish and geometry of the strainer body which happens to dictate the size and design of the strainer basket.

$$\text{Pressure Drop in PSI} = \left[\frac{\text{Flow Rate (GPM)}}{\text{Flow Coefficient (Cv)}}\right]^2$$

Just because "model A" has a Cv value higher than "model B" does not necessarily mean it will perform better. While a larger strainer basket is associated with a higher Cv value and can retain more material before requiring cleaning, much depends upon your flow rate and particle load.

If your flow rate is low for the pipeline size (a fluid velocity ≤ 5 FPS) the difference in flow resistance will likely be negligible. Likewise, if strainer baskets are cleaned based upon schedule and not only at high differential pressures, a design with a lower Cv would be functionally acceptable.

The following screen capture of our web-based differential pressure calculator compares (6) 8" 150# flanged cast steel simplex strainer models based upon user input application information. Even though 4 of the 6 strainer models have the same Cv, the variation in pricing is significant and this is a reflection of the difference in designs.

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Size (in): 8

GPM: 1768

1 Retention: Any Perfor

Sg: 1

SSU: 30

Enter your design criteria. Default values for specific gravity (Sg) and Viscosity (SSU) are based upon water

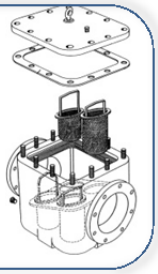
Performance comparison of various strainer brands/models: 2

BRAND	MODEL	Max. GPM:	Clean Δ PSI	Cv	COST
KECKLEY	SGFV	2,102	1.41	1486	$ 2,436.16
TITAN	BS35	2,263	1.22	1600	$ 4,831.69
	BS85	2,263	1.22	1600	$ 3,618.06
	BS86	2,263	1.22	1600	$ 3,222.19
EATON	72	1,980	1.59	1400	$ 9,165.80
	510	2,263	1.22	1600	$14,947.00

As an example, the 510 has a special low-to-the-floor, multi-basket design. Its straining ratio is the highest of all the strainers listed and the multi-basket design eliminates the need for overhead lifting devices. If you are only shopping for the lowest cost, you might not even realize that such a design exists!

Cast Model 510 Unique Features:

1. Four basket design doesn't require lifting devices or multiple personnel for basket cleaning
2. Compact size maximizes ergonomics and enables installation in tight areas
3. Angled basket design in support of minimal pressure drop



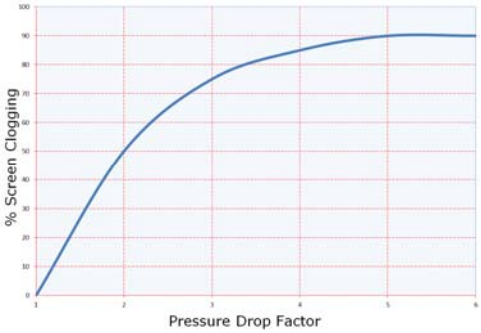
Strainer chamber covers can be secured to the strainer body with studs/nuts or a "quick opening" style that does not require tools to open the basket chamber, such as a yoke style clamp, swing bolts or knobs.

The design pressure for the strainer dictates which closure styles are applicable. A quick-opening cover design increases the convenience and reduces the labor time required to clean the strainer basket. However, this might not be a desirable feature for applications involving very hot or otherwise hazardous fluids.

Some manufacturers include threaded taps for differential pressure measurement and a vent valve while others charge an additional cost for these features. Such aspects are often overlooked but should be considered for a thorough comparison.

Venting the strainer basket chamber with a needle valve enables a slow and controlled release of vessel pressure as well as drainage of the strainer basket chamber. This is especially important when the process fluid is hazardous.

A pair of pressure gauges or an actual differential pressure gauge (available with switches and transmitters), measures the differential pressure across the strainer basket as an indication of clogging. If the differential pressure exceeds 15 to 20 PSIG there is increased likelihood of strainer basket damage. Ideally you want to clean the basket after the differential pressure increases by 5 PSIG above the initial "clean" differential pressure, which would indicate up to a 75-80% clogged basket.



There are many factors that to consider prior to selecting a simplex basket strainer that are not easily discerned with online searches based solely on size or price. Our company has nearly 30 years of experience and training in the application of pipeline strainers enabling us to provide valuable advice in support of choosing the best strainer design for your specific application.

Same size and material but very different designs

Once we have settled on the "best" strainer design for your specific application we can assist with providing the accessories you might need such as differential pressure gauges with or without switches and vent/drain/isolation valves that are compatible with your process.

Although we pioneered interactive sizing tools based upon fluid velocity and differential pressure to assist with selection of pipeline strainers, contact us to take advantage of the additional assistance we provide to you at no cost or obligation. This is our core field of expertise and we will quickly provide a recommendation, saving you time otherwise spent researching things yourself online.

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