Industrial Strainer Basket Designs
The "Heart" of an Industrial Pipeline Strainer

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At the very heart of all industrial simplex and duplex pipeline strainers is the internal element often referred to as a "strainer basket." This article will describe how most strainer baskets and elements are designed, highlighting little known modifications which can significantly improve performance of your filtration system.

In its simplest form, a strainer basket is a basket shaped object with a handle designed to collect particles entrained within a liquid.

The foremost important aspect of a strainer basket is its overall size, more specifically, its total surface area. Strainer baskets are often not interchangeable between brands; an Eaton strainer basket will not fit into a Titan strainer and vice-versa, even when the strainer bodies are the "same size." This is because "strainer basket size" is a reference to the inlet and outlet nozzle internal diameter and not correlated to the strainers differential pressure for a given flow rate.

This is why we focus on the open area ratio (OAR), flow coefficient (Cv) and differential pressure values for a specific size pipeline strainer and not just the "size" when comparing different models and brands. The Cv value reflects the resistance to flow for a particular strainer design whereas the differential pressure calculation reflects the combination of the strainer housing and strainer basket designs. The OAR is a way of comparing strainer baskets to each other. Lower cost is almost certainly due to a smaller size housing and strainer basket, thus increasing the differential pressure, liquid velocity, and frequency of basket cleaning.

Open Area Ratio

The proper way to compare the performance of strainer baskets is to compare the OAR, which is the comparison of the open area of the inlet nozzle to the open area of the strainer basket.

Larger ratios equate to a lower pressure drop across the strainer body and reduced frequency of basket cleaning because their surface area and volume are larger. Some strainer manufacturers publish the surface areas of their strainer baskets and others do not but they will provide that information if you request it. "Open Area" (OA) is the area of the openings within the strainer basket, and it is expressed as a percentage of the total surface area. Each perforation size has a different OA value. When the desired retention is finer than the finest perforation available, a separate layer of wire mesh is attached to the perforated substrate. The mesh also has a certain percentage of OA, thus when combined with the perforated substrate the total OA is reduced. You can calculate the surface area of a strainer basket and use the manufacturers OA figures for perforations and mesh to determine the overall OA of the strainer basket.

We automate the strainer comparison process to compare several brands and models simultaneously with a web-based calculator. Input the strainer size, flow rate, basket retention, specific gravity and viscosity and you can see which strainers have the lowest differential pressure.

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Size (in):	8
GPM:	1500
Retention:	MESH=40
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:

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BRAND	MODEL	Max. GPM:	Clean Δ PSI	Cv
KECKLEY	GFV	2,102	1.22	1486
TITAN	BS25	2,263	1.05	1600
	BS55/65	2,263	1.05	1600
EATON	30R	849	7.50	600
	72	1,980	1.38	1400
	510	2,263	1.05	1600

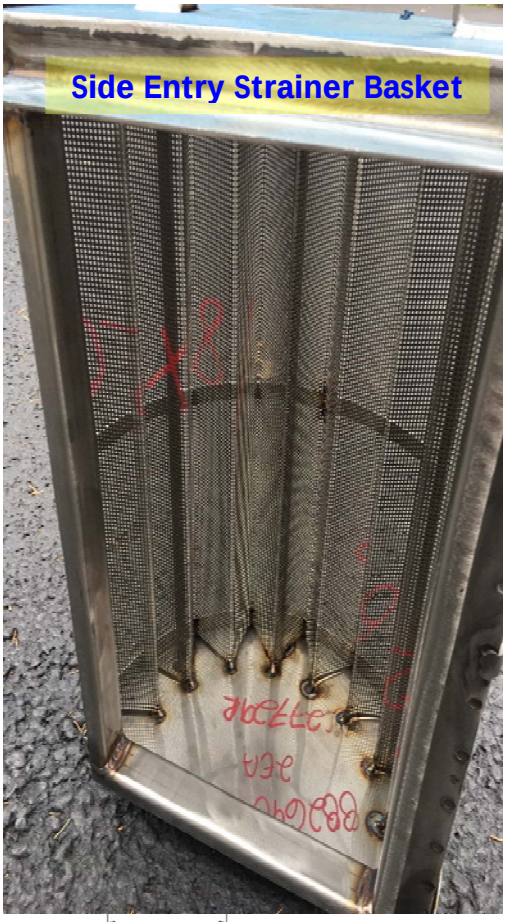
The body of most strainer baskets consists of a cylinder having one open end; the top end is open, and the bottom end is solid. The flow path for this style of strainer basket is "over the top." There is a sealing ring slightly larger in diameter then the

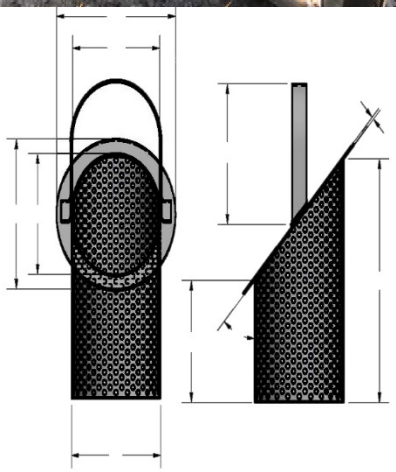
body to support the basket within the housing and to provide a bypass free seal between the strainer body and basket. Material accumulates against the interior circumference area of the basket and falls to the bottom depending upon the liquid characteristics, flow velocity and nature of the particles.

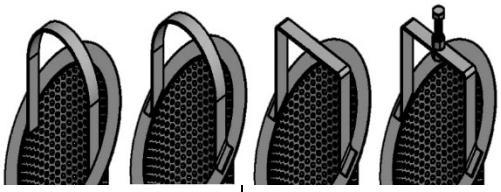
The body of the strainer basket is made from perforated stainless steel although can be made from other alloys if needed. When fine retention is required, a wire mesh is welded to the interior of the strainer basket. The perforated substrate supports the fine mesh material to withstand higher differential pressures. Some manufacturers sandwich fine mesh between layers of perforated material for added strength.

Strainer baskets are designed to withstand non-shock differential pressures up to 20 or 30 PSI; higher pressure systems or when there is increased potential for higher differential pressures requires using thicker materials and supports which may reduce the overall OAR. Strainers should be selected such that the clean basket differential pressure is ≤2 PSI and cleaned once the differential pressure reaches 8 PSI. Differential pressure increases exponentially when subjected to a continuous particle load due to the systematic reduction of OA available. If you set your basket cleaning differential pressure too high, you may not have enough time before the differential pressure exceeds the baskets design. "Water hammer" is another aspect to consider when establishing the initial and cleaning differential pressure thresholds.

Basket handles serve two other functions in addition to lifting it from the strainer body without contacting the process liquid. ①The handle is designed to be compressed between the strainer housing cover and the interior strainer basket support ring. The pressure exerted forms a tight seal to prevent liquid from bypassing the strainer basket. Some designs rely on precision mating surfaces for a metal-to-metal seal and others incorporate an o-ring under the strainer basket sealing ring to form a bypass-free seal with the strainer body. ②The forced tension of the strainer basket against its seat also helps prevent the basket from wear due to spinning; this is something that can happen when the handle is damaged, or the liquid velocity is too high. The mechanical rubbing between the strainer basket and strainer body will damage the surfaces of both components.







Alternate Designs

Some manufacturers offer unique strainer body and basket designs for specific types of applications.

An example are strainer baskets having a side entry flow path. This design reduces turbulence and differential pressure; it is preferred for large capacity suction strainers where it is desirable to maximize the NPSHa at the pump inlet.

Other designs have a slanted basket ring; the loss of surface area due to cylindrical length can be offset by increasing its diameter. An advantage of the slanted basket design is lower differential pressure and zero chance of spinning within the strainer housing under high velocity flow conditions.

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