Capturing energy-savings

A Comparison of traditional Y Strainers and Basket Strainers to the new LPD Strainer

Traditional Y-strainer

Traditional Basket Strainer

New LPD Y-Strainer

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Considering the y-strainer as a critical, energy-saving piping system component

Pumps, chillers, boilers and heat exchangers are the high-profile piping system components targeted to improve energy efficiency. More obvious in their energy consumption, these units are constantly being re-engineered, tested, measured and introduced to the market with improvements that measurably improve energy savings.

Other low-cost components in the system are routinely plugged into a design, accepted for their role in creating pressure drops and turbulence since there are no alternatives. One of these components is the strainer.

Today's traditional strainer design was actually introduced over 100 years ago. The strainer was created to protect expensive equipment, such as pumps, chillers, boilers and heat exchangers by removing debris from fluid before it reached these components. But, a century ago energy consumption was not a consideration and energy efficiency was an unknown concept.

It is now better understood how strainers add pressure top due to their antiquated design and a screen that accumulates debris and increasing pressure loss. This pressure loss translates into pumps increasing energy consumption.

It's time to consider the strainer's energy consumption.

A new strainer has recently been introduced. The new LPD y-strainer is redesigned from the ground up to provide superior pressure drop. Its internal geometry has been completely re-engineered, which also allows for a much larger screen with significantly increased debris capacity.

Following are comparisons between the century-old y-strainer and basket strainer designs and the new LPD y-strainer to assist in making a more informed decision on which component is right for your piping system.

Y-strainers

Y Strainers are widely used in hydronic systems and have been the most common type of strainer because

1) Unlike basket strainers they can be installed in horizontal and vertical pipe runs.
2) They can be blown down.
3) They are less expensive than basket strainers.

Basket Strainers

Basket strainers are the go to selection for strainers in "open" systems such as cooling towers. There were several perceived reasons for this.

1) Basket strainers have a higher capacity over the traditional "Y" strainer.
2) Basket strainers have a lower pressure drop.

3) Basket strainers are available with clamp on covers making cleaning the screen easier, then it would with a traditional “Y” strainer.

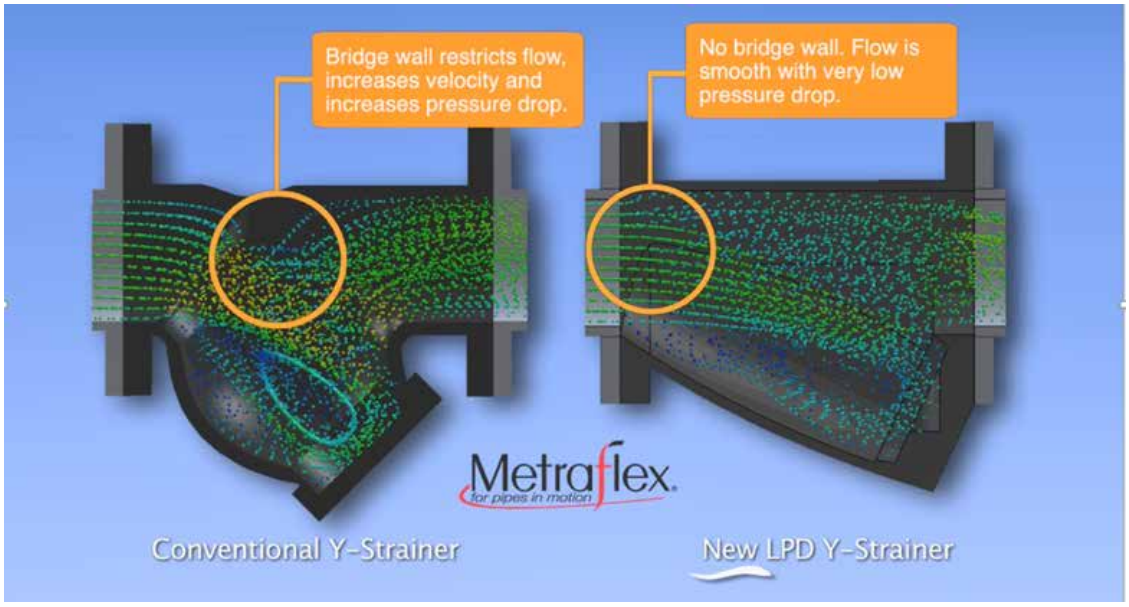

Figure 1

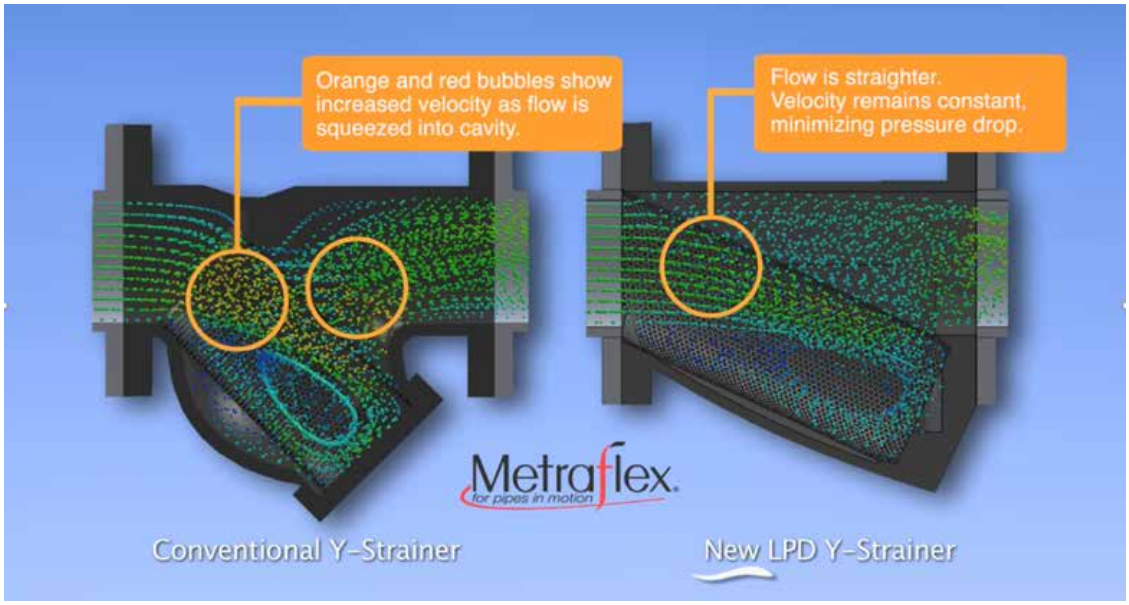

Figure 2

Taking a closer look at these points we will address some long-standing misconceptions about strainers, and discuss alternatives that will improve piping design.

The redesign of the strainer started with the basic Y strainer to take advantage of the versatility of vertical and horizontal installation, the ability to blown down and the lower cost.

A CFD analysis and quickly confirmed the obvious, that the bridgewall universally used in Y strainer design caused restriction and an abrupt change in direction of flow, a big contributer to pressure drop.

In the new design, the bridge wall has been eliminated. See CFD analysis results below.

The bridge wall restricted flow and created turbulence in the strainer resulting in increased pressure loss (**Figures 1 and 2**).

The next design improvement - the pitch of the screen. Screen pitch was lowered from 45º to 22.5º.

The lower pitch resulted in a much larger area of

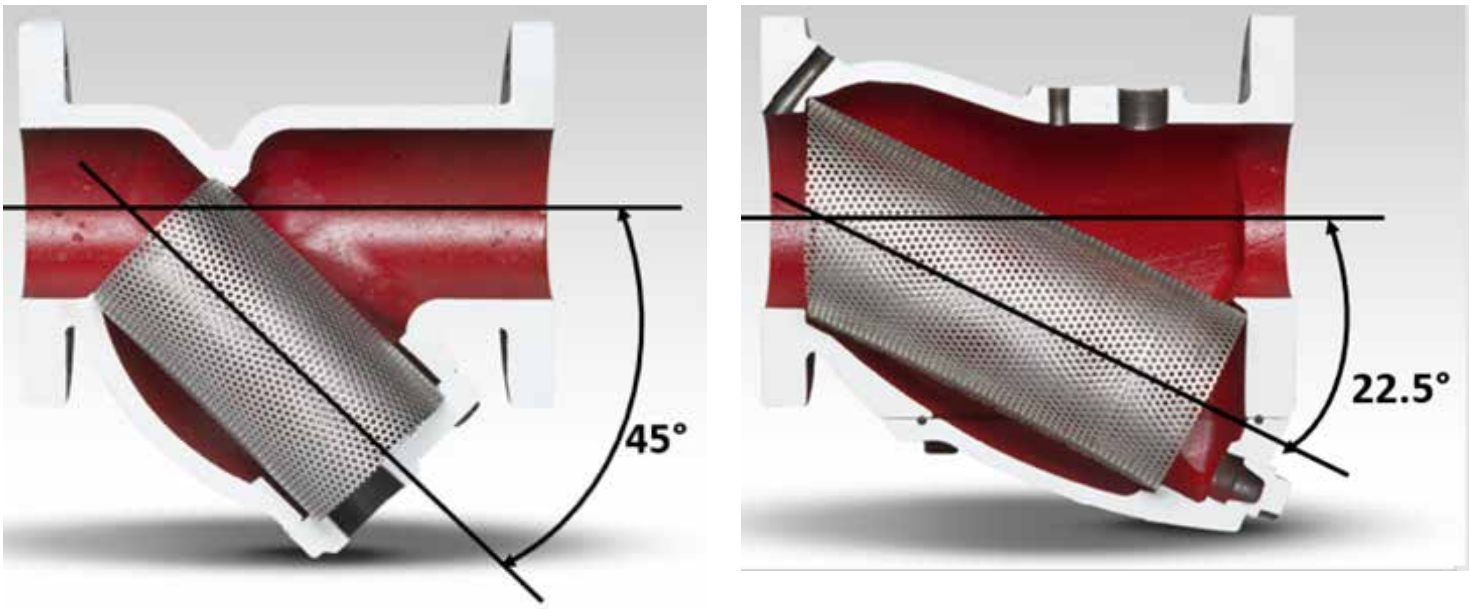

Figure 3A: The old, traditional strainer, left, has a steeper screen pitch. RIght, the new LPD Y-strainer has a shallower pitch allowing the screen to be much longer.

the screen to be in the flow path. This resulted in lower internal velocity and lower pressure drop (**Figures 3A and 3B**).

The change in pitch now allowed the screen to be much longer. Then as part of the redesign the casting was made larger to increase screen diameter (**Figures 4A and B**).

The result was not only a screen with much larger area for debris capacity, but a much larger screen area in the fluid flow.

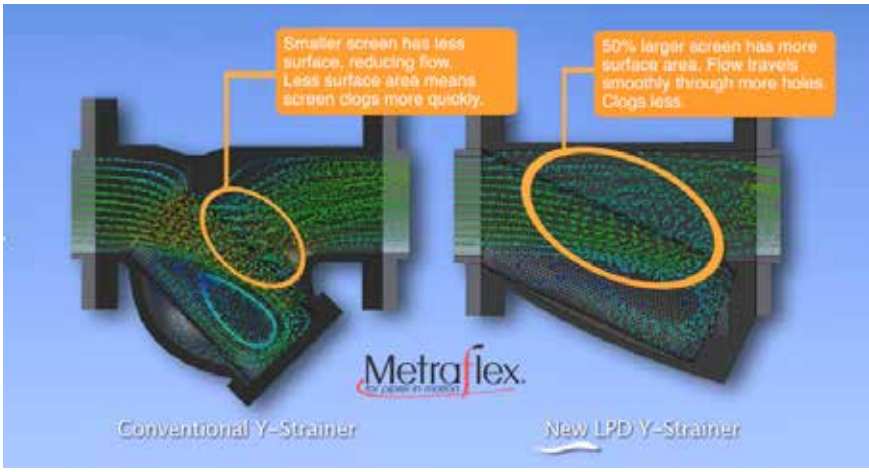

Figure 3B: The smaller screen in the old, traditional strainer, left, has less surface area and clogs more quickly. Right, the screen in the LPD Y-strainer has more surface area and more holes, so it takes longer for debris to clog the screen.

Figure 4: Comparisons between traditional strainer screens and the new LPD Y-strainer

Size	Basket Strainer Screen Area in^2	Y-Stainer Screen Area in^2	LPD Y-Strainer Screen Area in^2
2”	29.97	51.55	52
2.5”	45.11	70.01	84.6
3”	78.2	61.34	99
4”	108.44	99.64	147
6”	176.75	242.72	317
8”	310.03	411.16	515
10”	457.06	610.51	745.2
12”	691.07	835.53	1035.1

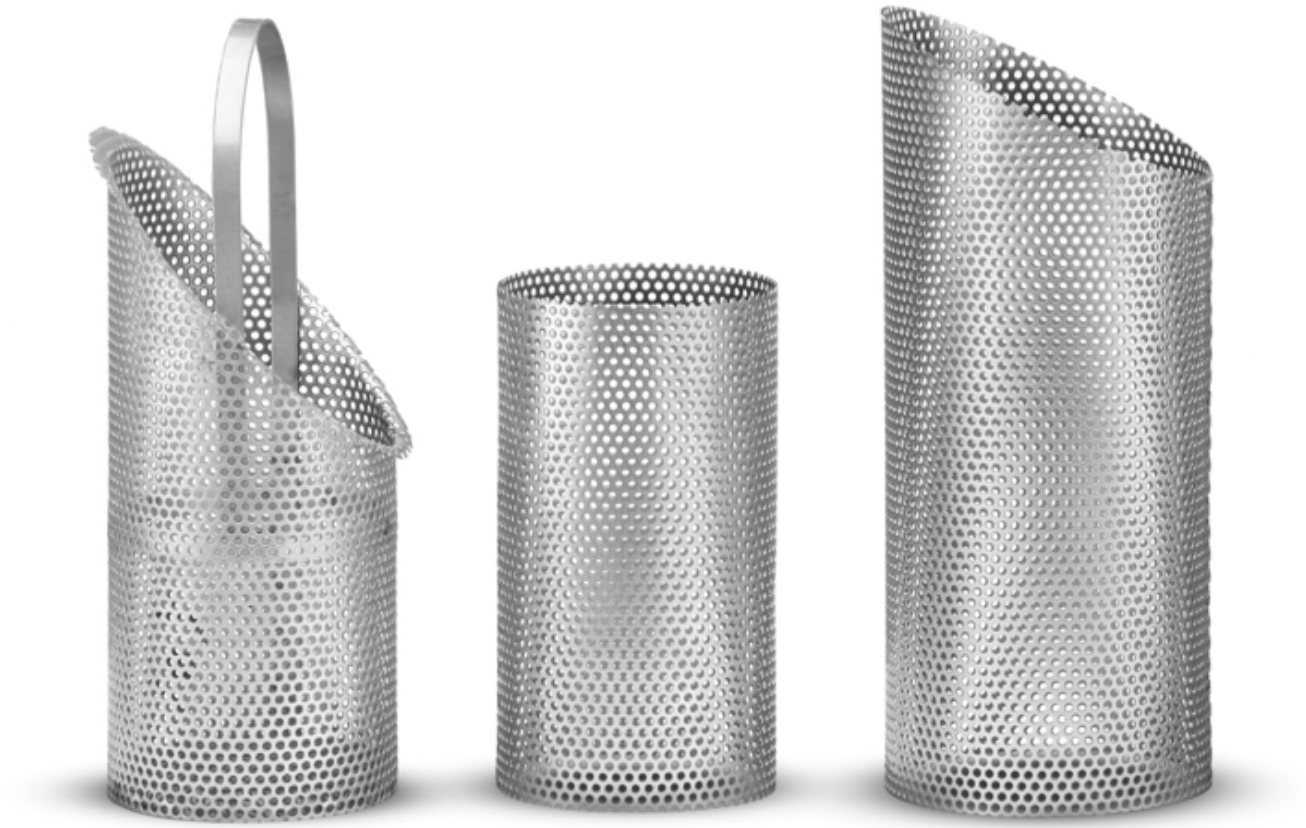

Figure 4B: Four-inch strainer screens. Basket strainer screen, left, y-strainer screen, center, and LPD Y-strainer screen, right.

The results of all these design improvements result in a major improvement in the CV values of the LPD strainer, in some sizes almost double that for the old fashioned Y strainer and substantially better than a basket strainer as shown in **(Figure 5**).

Note, the CV values shown (**Figure 6**) are results from independent testing. We have found several basket strainer manufacturers literature that had much higher values that we believe to be overstated.

Probably the best feature of the LPD is its ability to capture debris. The same amount of debris in an LPD will have far less of an impact than it would in a traditional Y strainer or basket strainer. Using a dollar bill to represent the same debris blockage in each screen (**Figure 7**), it is obvious how much more unobstructed screen area is available in a 4-inch LPD vs a traditional, old-style 4-inch strainer.

To demonstrate how the difference in pressure drop is even more dramatic between the two LPD and the traditional

Figure 5: C_v comparisons between traditional strainer screens and the new LPD Y-strainer

Size	C_V Basket Strainer	C_V Y-Stainer	C_V LPD Y-Strainer
4”	326	232	457
6”	-	614	976
8”	1130	888	1607
10”	-	1413	2574

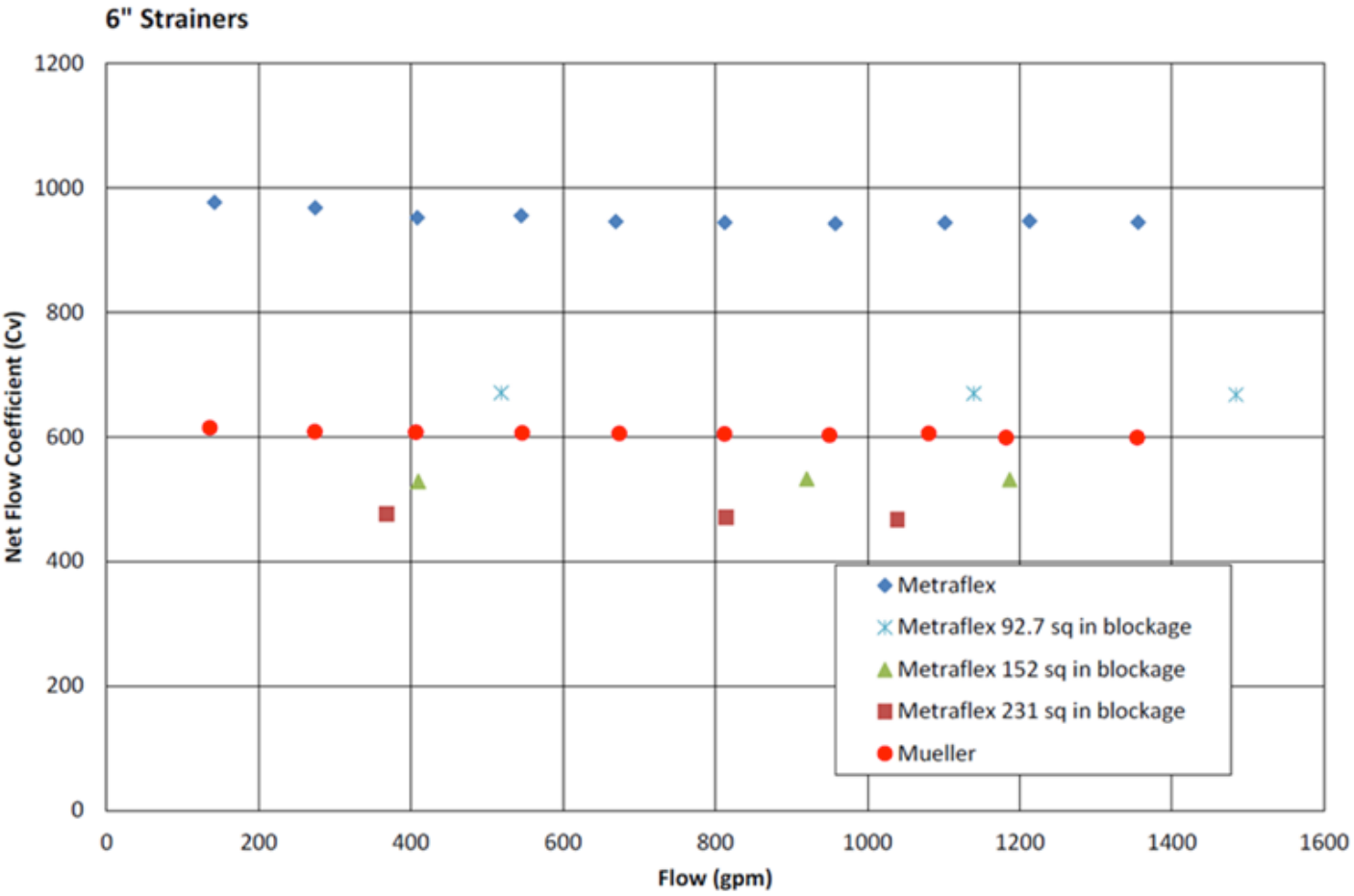

Figure 6: Independent testing results comparing a clean LPD Y-strainer, and various amount of debris blockage, to a completely clean competitor strainer.

Figure 7: using a dollar bill to represent blockage, it is evident the exact same amount of debris blockage represents a much smaller percentage of the LPD Y-strainer screen.

y-strainer, a test compared an LPD strainer with 92.7 in2 of blockage (29% blocked) still has a better CV than a 100% clean competitive strainer.

The larger capacity of the LPD strainer screen also means that you do not have to blow it down as often as a standard Y strain reducing maintenance costs.

Y-strainer vs Basket strainers

Basket strainers are considered easier to clean than y strainers. If shut off valves are properly located, the basket strainer does not lose water or require the system be drained to clean.

However, the LPD can be blown down where the basket strainer cannot. If blown down, the LPD may not even need to be cleaned.

The basket strainer is available with a clamp-on cover requiring only one bolt to be loosened to remove the cover. Depending on the manufacturer, clamp-on covers result in a lower pressure rating than a standard flange cover. This is normally a big advantage over a traditional Y strainer using a standard pipe flange for a cover. However, the new LPD design features a cover with 4 or 6 bolts depending on the size. Additionally, the cover of LPD strainers 10” and larger are hinged for easier handling.

Whenever a cover is removed from any of the traditional basket strainers or y strainers there is often a custom gasket that needs to be replaced. The LPD strainer uses a reusable O-ring seal.

In conclusion, it is taken for granted that science and technology has improved virtually everything around us. However, it has been over 100 years since technology has tackled the inherent flaws in y-strainer design. With the introduction of the new LPD y-strainer, significant energy savings have been captured with its new design. The LPD y-strainer is a significant improvement over other strainers, making it the best performing strainer on the market today.

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