OUR 75TH YEAR
OHIO FABRICATORS COMPANY

White Paper

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Suction Line Straining
In-Tank Suction Strainer vs. Tank Mounted Strainer

I'm sure anyone who has anything to do with the operation of a hydraulic system, realizes and understands it needs to be an effective and smooth running operation. After all, if the system is not operating due to downtime caused by especially poor servicing, it is not being productive and money is just being thrown away. The most important component in any hydraulic system is the pump. If the pump breaks down, the system breaks down. It is like the human heart. If the human heart goes down, life ends. That's it! Therefore, the wise decision would be to protect the pump. Possibly the two most effective components in the hydraulic system are the pump and the strainer that protects it. As the pump performs its job, the strainer is in place to capture the debris to ensure the pump can continue to function as it is designed to.

Pumps are built to take a beating, but none the less, some prudent protection is in order to keep problems from occurring and to maintain an operation running at peak performance. The best cure for any possible problem is prevention, and the low cost of suction strainers is extremely beneficial. It is not uncommon to find items that have inadvertently fallen, been knocked or kicked, or somehow accidentally gone into the reservoir during servicing at some point. If a nut, bolt, or screw, or any object that isn't supposed to be there, for instance, got into the suction line, it could be the end of the life of the pump.

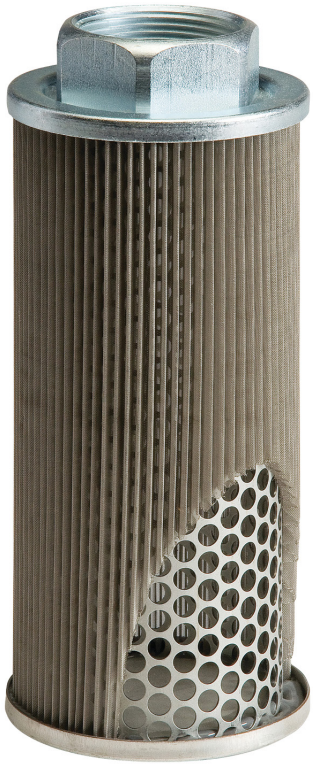
Please install some sort of pressure drop indicator on the suction side so the delta P can be monitored. This will indicate if the strainer is reaching the end of its service life. If a strainer becomes indexed and flow is restricted, the strainer would collapse which will have disastrous results. The suction line does not require a fine filtering but a simple straining, merely to protect the pump. Too fine of filtering could very possibly cause cavitation to occur and this would cause additional problems. Also ensure the correct sized strainer, one that meets the system's flow requirements is installed. If the strainer fails to meet certain requirements, it could also potentially cause irreversible damage to the system.

Both suction strainers and tank mounted strainers can be furnished for applications requiring anywhere up to 100 gpm, sometimes higher for special applications. Most are available for petroleum based fluid applications. That means the support tube or the core, and end caps would be made of plated steel. The wire mesh is pleated stainless steel and normally used in a suction strainer anywhere between 30 mesh (595 microns) and 100 mesh (149 microns).

There are generally three types of suction strainers. One is "in-line," where a strainer element is located inside a housing mounted between the inlet line and the pump. This type would require opening the housing to remove the filter element for servicing. However, the two most common types and lowest cost suction strainers are the "in-tank" suction strainer and the "tank mounted strainer." Let's take a look at both of the most common ones to see which one would work best in your application.

Suction Strainer

Suction strainers are made with both female and male NPT threads. The strainers are threaded onto the end of the inlet line installed on the inside at the bottom of the reservoir. You can also select a strainer made with a relief valve which would open up the strainer for free flow of fluid if the strainer was becoming too indexed. Too much restriction of the flow could cause cavitation at the pump, also destructive.



Suction strainers come in various sizes, as well, to accommodate the flow rate of the pump. The flow could be anywhere from 3 gpm to as high as 100 gpm. Standard pipe sizes available in suction strainers are anywhere up to 3" NPT.

To be serviced, the reservoir should be drained before the strainer is removed for servicing or replacement. At this time the reservoir should be cleaned adequately, as well. The strainer can be cleaned with a soft bristle brush and cleaning solvent and replaced if needed. Do not apply pressure to the wire cloth. The wire cloth strands could spread open and cause the strainer to lose its integrity. HINT! Ultrasonic cleaning is quicker and more efficient. It can also merely

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be replaced with a new strainer. Suction strainers are very low cost which makes it ideal for replacing.

The suction strainer must be kept below the top of the fluid which good practice means it should be mounted toward the bottom of the reservoir. If the fluid level gets low and the surface of the strainer is exposed, the pump will take in air from the headspace in the reservoir causing aeriation which will damage or destroy the pump. That is why it is important to always keep a sight level gauge on the front of the reservoir so the fluid level can be monitored.

Usually reservoirs that have a large enough cover or clean-out port on them, are easier to install a suction strainer inside when the system is down for servicing. Maintenance personnel has adequate room to maneuver inside the empty reservoir to replace the strainer. It is more of a challenge on smaller reservoirs. Suction strainers generally have more screen area than their corresponding tank mounted strainer, although both can accommodate the same flow rate as each indicates.

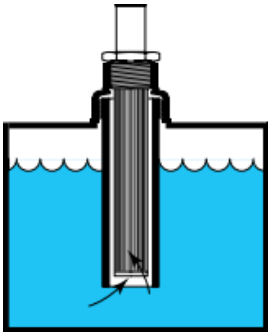
Tank Mounted Suction Strainer

Tank mounted strainers, like suction strainers, are another type used for suction applications. This type of strainer is threaded into the side, at the bottom, from the outside of the reservoir. A hole is cut into the reservoir before a weld flange is welded to it. The flange gives the tank mounted strainer support when installing and while in use. The inlet line is then threaded into the female threads on the strainer, thus allowing flow to the pump and beyond.

When a system is designed and specified components placed where intended, it is easier to remove and service the strainer from the outside of reservoir instead of going through the inside of the reservoir. As with suction strainers, tank mounts have the same relief valve option so if the strainer is indexed or it is building up pressure drop, the pump will still be able to allow fluid flow to prevent cavitation and possible pump destruction. Contrary to the relief valve indication, if the pressure drop indicator reads no pressure drop continuously for a lengthy time while in operation, it may mean the strainer is indexed and the relief valve is open, allowing full, unfiltered flow to pass through it. This would be an indication to service the strainer.

Tank mounted strainers are the choice for low flow systems that require smaller sized reservoirs and where accessing the inside of the reservoir may be challenging or impossible. No matter what sized strainer is used it is always wise to install some sort of gauge to monitor the pressure drop.

Tank mounted strainers can also be used a couple of other ways. They can be installed through a tank top by welding a standard bell reducer (coupler) over a hole cut in the top of the reservoir. Please note the image. A standpipe threaded into the coupling, needs to be only long enough to stay below the lowest fluid level the reservoir will have. The strainer can be removed for servicing without draining the reservoir. There is no need to access the interior of the reservoir to service the tank mounted strainer.



The tank mounted strainer can also be used as an “in-line” strainer with a simple modification. Using standard pipe fittings a “housing” for a strainer can quickly be made and threaded in-line between the inlet line leaving the reservoir, and the pump.

Tank mounted strainers offer easy installation. Access to the reservoir interior is not always needed. You can mount these units through a sidewall, through a reservoir top, or by using standard pipe fittings for an in-line strainer.

Final Thoughts

I’ve been campaigning for suction straining for over 25 years in the industry. The pump must be protected because of its importance in the operation of the system. There are those who have downplayed suction straining because it is thought that if adequate filtration throughout the system is in place, no suction straining is necessary. By not installing a suction strainer to protect the pump, it is doing the system a great disservice. Therefore, I mention to all owners, operators, maintenance personnel, engineers, and system designers, take ownership of the responsibilities required to keep a system running smoothly. It is a foremost task to take. Whether it is installing a tank mounted strainer or the standard suction strainer, it is wisdom at work.