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Tech Brief

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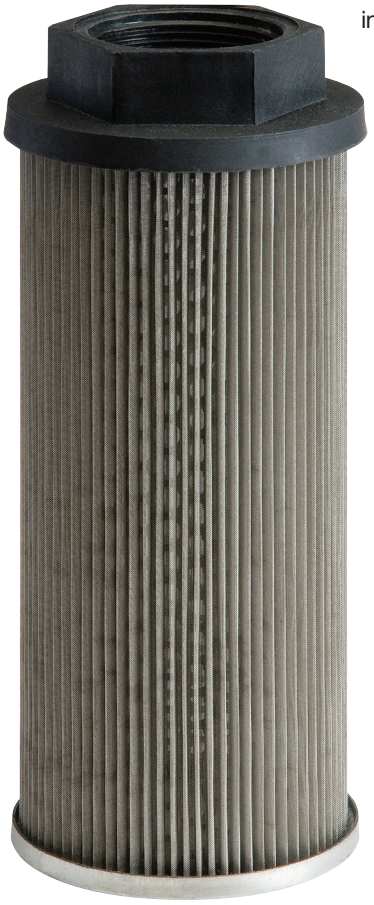
A Brief Introduction to Hydraulic System Filter Placement

Filtration has come a long way since the beginning of time. It goes all the way back to ancient times. Ancient Indo-European records refer to placing water in copper kettles, heating it, exposing it to sunlight, and running the water through charcoal. The idea of filtration goes back a long, long way.

The development of science through the ages has brought us to the point where we not only filter solid particles but even molecules. The human eye can see no smaller than 40 microns, the human hair averages 50-70 microns in diameter and a grain of table salt is about 100 microns. If there is an area that some do not think of very much when designing and operating a hydraulic system, it is filtration and the placement of filters. Think about it for a moment—here you are with a $15,000,000 power system, or even a $10,000 car engine, the inlet filter plugs (if there is one), the pump cavitates, and there goes the system. The pump, being the heart of all power systems, is destroyed—all because of a simple, inexpensive, inlet filter, which was not maintained, or maybe one never existed in the first place. Too much resistance to flow creates considerable power loss and ineffectual operation, or equipment failure.



There needs to be proper filter placement if a system is going to operate at peak performance. When installing filters at different locations there are many variables to consider, too. What is the system trying to achieve? What is the end product? How fine of filtration should there be at these locations to be effective? Are tight tolerances required in the operation? What is the outside environment like? Is it hot, humid, inside, or outside? What is the flow rate of the pump? What is system pressure? The list of considerations goes on. There are many factors involved when sizing and installing proper filtration devices to the system. In general terms, there are four locations where some sort of filter should be placed.

The initial placement should be a suction strainer on the suction side of the pump. The pump is the heart of any hydraulic system. Pumps can take a beating, some more than others, but they must be protected. The suction strainer is installed for the purpose of keeping the larger pieces of contamination out of the pump.

The next place of installation is the pressure line, between the pump and the actuation. This is usually where the finest filtration should be in place. The actuation, the device that is performing the function of the system, must be protected if the system is to perform properly. That requires finer filtration than elsewhere.

The return line should clean up the fluid before it re-enters the reservoir. There will be contamination generated by the moving components in the system and before it travels back into the reservoir. It should be free of any contamination the fluid picked up along the way.

We touched on the suction line, pressure line, and return line. Where else should a filter be installed? Don't forget the tank breather. As the fluid level in the reservoir rises and falls while in operation, air enters the reservoir, and it is expelled from the reservoir through a breather port. There are contaminants in the air that can get into the system as air enters. These contaminants must be kept out of the operation. A simple, properly sized tank breather usually takes care of this.

Filters are relatively inexpensive and well worth the investment. For the cost of a filter it may mean the difference between a smooth-running or poor operation.