

# Drive & Control profile

## Hydraulic fluid cleanliness: 5 tips to protect your systems



Oil is the central component of any hydraulic system—and quite often, hydraulic system failure can be tied directly to oil contamination.

One of the most commonly cited statistics in industrial hydraulic systems is this: Nearly 80% of all problems in hydraulic systems can be traced back to contaminated fluid. Effective hydraulic fluid filtration, including proper monitoring and management of operating fluid condition and cleanliness, can make a dramatic improvement in the

performance, longevity and efficient operation of your hydraulic systems.

As the world leader in hydraulics products and engineered solutions for industrial and mobile applications, Bosch Rexroth brings a level of understanding and technical insight into all the key issues and conditions that impact the performance,

Protect your systems  
with these 5 steps

- **Filter new oil before filling a reservoir or system:** New oil is not machine ready oil; always filter new oil prior to loading.
- **Match oil cleanliness to system requirements:** Understand the requirements set by your system's manufacturer and ensure filtration you choose meets that level.
- **Consider hydraulic systems designed with easily accessible filter systems;** otherwise, maintenance and filter replacement will lag or be routinely postponed.
- **Set up a maintenance schedule** based on your operational requirements, based on environmental conditions, where, how frequently the system is operated and filtration system design.
- **Clean the areas around the filter** before you change it; this prevents accidental intrusion of dirt particles.

reliability and long-term value of hydraulics equipment.

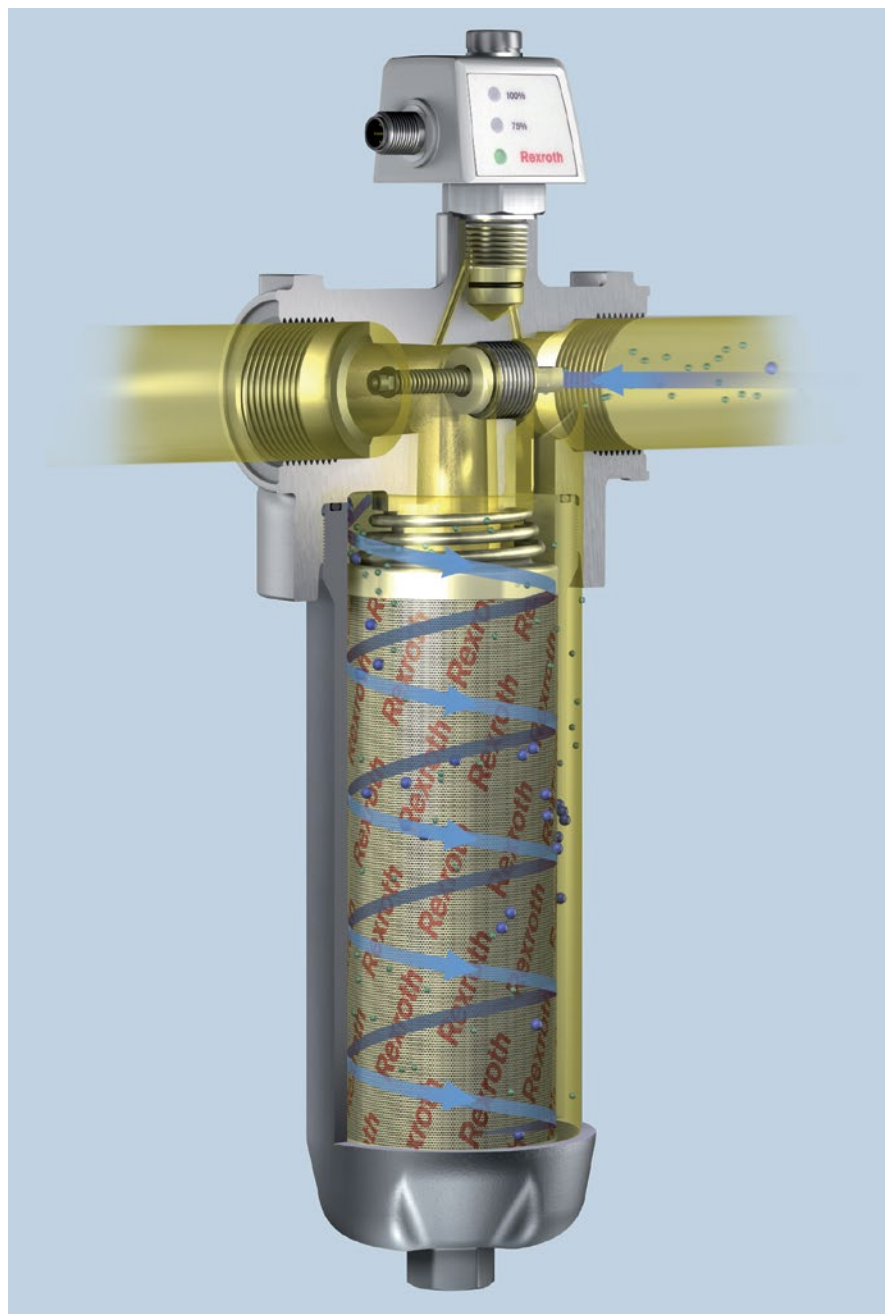
As a manufacturer of proven hydraulic filtration systems and filters, we have invested significant engineering time and effort to advance filtration technology, helping to improve the protection we can offer. Our experience designing these products has given us deep insight into the best approach to hydraulic filtration.

These tips are based on that experience, and are designed to provide a set of best practices and practical guidelines to help you manage filtration in your systems.

**New oil is not clean oil:** Although it is not a commonly known fact, oil from a typical 55 gallon drum can have an ISO rating of 23/21/18 or worse. This is rarely clean enough for a normal application. Standard practice should be to pre-filter new oil prior to filling the machine or the system reservoir; the recommended method is to cycle the new oil through a kidney loop prior to startup.

If new oil is not pre-filtered, and used as-is, it can lead to early failure of components and pumps, as well as premature filter clogging; this can cause the filtration system to go into bypass, and require additional maintenance, such as changing filters or elements.

**Match oil cleanliness to your system's requirements:** Today's hydraulic systems are designed with a variety of different components, including high response valves and pumps, in order to maximize the performance of the equipment. To achieve higher response and



Bosch Rexroth has developed cutting-edge hydraulics filtration solutions, such as our “cyclone” filter concept, which guides particles through the filter in a spiral pattern, improving flow and increasing absorption capacity.

accuracies, these components often require a much cleaner oil system than one utilizing gear pumps and standard control valves. Make sure you understand the requirements of your system and that the filtration applied is capable of maintaining that level.

Always refer to the hydraulic supplier's recommended cleanliness levels for their product to maximize life.

If the manufacturer's target cleanliness level is not maintained, it can cause premature failure

of components and reduce the effectiveness and control for which the system was designed. In addition, targeted oil cleanliness levels may be a prerequisite for equipment warranty; if significant failures or equipment damage is the result of oil cleanliness that has not met the manufacturer's requirements, the warranty may be voided.

**Consider hydraulic systems designed with easily accessible filter systems:**

A challenge to any maintenance program is how easy – or difficult – it is to access equipment that requires regular maintenance activity. The more difficult it is to change filters per a maintenance plan, the less likely they are to be properly serviced.

Filters that are located in tight locations or not in plain view are often not serviced or can even have the filter elements removed (in the case of canister style filters, for example.) Removal of the filter or not replacing the filter will permit dirty oil to pass directly to the equipment causing premature failure and reduction in performance. Although it may seem a minor point when a system is being designed and engineered, it makes long-term sense to review the accessibility of the oil filtration system, and make adjustments in the system design to help ensure that regular maintenance of filters is not a complex or time-consuming operational issue.

**Set up a maintenance schedule based on your operational requirements:**

Every production environment, equipment design, and system usage is different – and that means different filtration maintenance. Service intervals are going to be determined

by how dirty the environment is where the equipment is used, how frequently the system is operated, and the design of the filtration system.

No matter what the conditions, hydraulic filters need to be changed – and the interval defining when they need to be changed can be identified by regularly sampling hydraulic fluid conditions. It is highly recommended that you establish and maintain a fluid sampling plan; it is the best way to monitor and to know when service is required. Maintenance indicators on filters are a good visual indication of clogged filters that require replacement.

Schedules standardize the practice: using rules of thumb to change filters can lead to either unnecessary filter

exchanges, which adds to costs, or leaving a filter in place too long. Failure to change the filter often enough can lead to equipment failure, increased downtime, and costly repairs.

**Clean the area around the filter**

**before changing the filter:** Hydraulic environments are often dirty and contain harmful contaminants. Minimize the intrusion of these particles by cleaning the area around the filter connection.

Changing filters with large amounts of dirt and dust on and around them can allow ingress of potentially harmful contaminants into the system and dramatically reduce the effectiveness of the filter protecting precision hydraulic components. This is a step



Regular and careful sampling and analysis, using kits such as this one available from Bosch Rexroth, help prevent contaminants from rising above key thresholds and keep you informed of oil conditions.

that is commonly overlooked by busy maintenance crews, but taking the time to clean the area before changing the filter eliminates contaminants at the source, before they can get into the fluid and filtration system.

To help you understand and manage hydraulic filtration more effectively, Bosch Rexroth has published a booklet to help determine sources of problems with hydraulic systems and develop insight toward contamination control.

The *Rexroth Oil Cleanliness Booklet* is a free 44-page pocket-sized booklet, printed on oil-resistant paper, with detailed overviews of key filtration principles, charts explaining fitting tolerances of hydraulic components and recommended oil cleanliness levels in accordance with ISO 4406 for different application types, along with suggested filter material/filtration grades. It can be ordered by visiting [www.boschrexroth-us.com/filter](http://www.boschrexroth-us.com/filter).



Bosch Rexroth offers a free 40-page *Oil Cleanliness Booklet* (printed on oil-resistant paper) that provides insight on sources of fluid system problems, guidelines for maintenance, and oil cleanliness codes and regulations.

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