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Why Is There Water in my Oil?

by Chris Dellinger | Fluid Maintenance, Reliability, Troubleshooting

Sometimes our customers find that the oil in their reservoir has become contaminated by water. Questions that often arise are, is it normal? How does it get there? How can I remove it? How can I keep it out in the future?

Hygroscopic Breather Saturated with Water

There are a number of ways water can find its way into the oil. One very common point of ingress is through the breather cap. Particularly on systems that are exposed to the elements, rain can leak into the reservoir, water can seep through reservoir covers or into the access plate through a worn seal. Also very humid outside air can come in the breather cap and changes in temperature cause that air to release its water into the oil. This can be avoided by replacing the standard breather with a hygroscopic breather. This type of breather has a canister containing desiccant crystals. Water in the air that enters the breather is absorbed by these crystals. When the crystals become saturated with water, they will change color. The breather must then be replaced or some

desiccant canisters can be opened so that the crystals can be removed, placed on a tray in an oven at about 200 degrees Fahrenheit and dried out to regenerate the crystals.

Sometimes a water-type heat exchanger can rupture and leak water into the oil.

Pressure washing can get water into the oil. Whenever the machine is being cleaned, care should be taken not to allow water into the breather.

Another way that water can collect in the reservoir is by condensation of air that remains in the hydraulic lines when the system is shut down. A tank line check valve can be installed to keep oil in the lines. The check valve should be installed just prior to where the tank line enters the reservoir and should have a spring tension of about 75 PSI (5 Bar) or less – just enough to keep oil in the lines without causing excessive back pressure against components.

Leaky seals can not only allow oil to escape the system – they can allow air (and a lot of other undesirable things) in. Repair leaks as soon as they are noted.

A pump that is aerating is drawing outside air with its water content (and other contaminants) into the machine.

These are the most common ways that water can get in, but why is it such a bad thing? Well, for one thing, water can deplete certain additives in the oil, affecting the lubrication of the machine and the detergent properties. Water can even combine with certain additives to form corrosive agents that actually eat away at metal surfaces. At best, water can decrease the film strength of lubricants and leave components vulnerable to wear. Water getting into the oil always causes problems, even in water-glycol based systems where water must be added periodically to offset evaporation. When water is added to these systems, it must be distilled water, not contaminated water from the surrounding air.

GPM Model 120 Flushing Machine

So how much water is too much? That varies considerably by a number of factors, but the best target level is as little as possible. For mineral oil systems, water should at least be kept below the point where the oil becomes visibly milky. This will usually occur if the water level of the oil gets as high as about 200 – 250 ppm (parts per million). At this point, it is imperative that the water be removed. This is best done using a coalescing depth filter. This is the type of filter on our flushing machines. The depth media is impregnated with an absorbent polymer agent that will trap the water in the oil. Each element can absorb about one gallon of water.
But, as with any other type of contamination, it is always much cheaper to keep water out of the oil than it is to remove it once it is in there.

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