



OIL vs AIR – Why It Matters for our Motors

A debate in the submersible wastewater pump industry has been regarding which is better - an oil-filled motor or an air-filled motor. An oil-filled pump is defined as having the motor cavity filled with oil, usually to cover the upper bearing and windings. An air-filled pump is one that does not use oil to fill the motor cavity. Here, we'll share why Zoeller predominately chooses an oil-filled motor to provide the most dependable product to our customers.

According to the SWPA (Submersible Wastewater Pump Association) handbook, "With a submersible pump, heat transfer is accomplished by direct conduction to the relatively constant temperature fluid being pumped. This more efficient heat transfer method, versus a dry-mounted pump, results in a lower operating temperature for the motor and its internal components, and it helps extend the life of the motor."

Let's take the above quote one step further. If it is beneficial to submerge the pump in water for better heat transfer, then why not submerge the stator in oil for the same reason? Oil-filled motors lower the winding temperature through extra heat transfer away from the stator, to the housings, and then out into the liquid. We all know heat has a negative impact on electrical components, so any effort to lower the operating temperature inside the pump will yield a longer-lasting product. Other advantages include a more uniform winding temperature, which eliminates destructive hot spots in the motor, and permanently lubricated bearings and seals, which will extend the product life due to a lower risk of overheating.

Without the oil to provide constant heat dissipation from the motor, the biggest disadvantage to an air-filled pump is the higher risk to overheat and burn up the motor. This will shorten the product life and require complete replacement of the pump rather than a simple repair.

The disadvantage to oil-filled motors is that they yield a lower overall efficiency when compared to an air-filled motor. This lowered efficiency carries about a 2% increase in overall energy costs. In addition, although the oil should remain inside the pump, it has been argued that the use of oil is not environmentally friendly.