

Finding the Best Pump for Mine Face Dewatering

Why SANDPIPER AODD pumps are the
right choice over electric submersibles.

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Introduction

When mining underground, the number one danger to all miners is water. Water at the mine face has always been a particular challenge, as this section is the newest area of the mine with many potential unknowns behind it. Water comes from seepage through rock cracks, hidden cavities, and the drill rigs themselves. It's always a present danger for miners.

Limited pool storage for water at the mine face combined with risks to health, safety, and equipment make the challenge to extract water from this environment an important one. This whitepaper describes the benefits of SANDPIPER's air-operated double-diaphragm (AODD) pumps over other pumps, which include:

- Increased portability in challenging mining conditions
- No need for electricians or other specialists for operation
- A drastically decreased risk of overheating from running dry

Keep reading to learn more about how SANDPIPER's AODD pumps can make mines safer and more efficient.



Background

Other Pump Technologies

Traditionally, miners use a pump to draw wastewater away to a larger pool where more pumps are used to draw it to upper levels (depending on the depth of the mine) and eventually above ground.

A common pumping technology used at the mine face is the electric submersible pump (ESP). These pumps are centrifugal pumps, which means they use a rotating impeller to draw fluid in and push it through the outlet of the pump. However, ESPs cause several pumping challenges at the mine face.

Running Dry:

Since the water pumped out of a mine is usually seepage, there is a constant collection of it. Using ESPs will work, but there is always a minimum depth before the pumps start to run dry.

Running ESPs dry will cause their lower mechanical seal to heat up due to the speed of the turning impeller from the electric motor. A sudden impact of fresh water could cause the mechanical seal to rapidly reduce in temperature, possibly leading to premature failure where water would be exposed to the rotor stator. This would render the submersible pump useless and require maintenance such as seal replacements, motor rewind, or at the very least, a “bake and varnish” of the stator.

A solution to overcome this issue would involve using float switches to turn the ESP on and off. However, in practice with large equipment, these float switches are often damaged prematurely and continue the cycle of maintenance. This presents other issues when ESPs are used underground.

Portability:

ESPs have many issues when it comes to portability:

- ESPs require an electrician on-site to install or remove the electrical cable
- ESPs with heavy motors require special lifting equipment to move them
- ESPs are limited to their electric cables
- With water always around, ESP electric cables damaged by heavy equipment present a health and safety risk to employees

Background cont.

pH Levels:

The pH levels of seepage water will vary depending on where a mine is geographically located. This could harm the casting material the electric submersible is made from. The bigger cast iron submersible pumps would probably endure such exposure, but at the mine's face, the amount of water needed to be pumped requires smaller pumping units, usually with different materials depending on the brand.

Limited Flow Rate Range:

As stated before, an ESP is based on a centrifugal principle, meaning that at a certain speed of rotation the pump will produce a flow rate against a specific total manometric head. To meet the ever-changing water demand, the pump's flow rate is either fixed to the pump's rpm limitation and a fixed total head, or expensive additional equipment like an AC inverter is used to regulate the speed proportionally to the flow rate. Remember, the size of the impeller within the volute of the pump also restricts these parameters.

Other Centrifugal Pump Issues:

Other centrifugal pumps used at the mine face are similar to ESPs. The primary difference is that, instead of submerging these pumps in water, you use a suction hose to allow water into the impeller and discharge out of the volute. Besides priming obstacles, the technology and inherent pumping issues at the mine face are the same as the submersible principle's shortfalls. You will, however, need to make use of a strainer and foot valve to ensure the volute is fully in order for the centrifugal to prime. It's important to note that centrifugal/submersible pumps do not suck liquid, as they require liquid within the volute to draw new liquid in and are subject to NPSHr.

Benefits of AODD Pumps at the Mine Face

Warren Rupp's SANDPIPER AODD pumps offer many solutions to dewatering the mine face. Let's explore this technology. First, to best describe the solutions SANDPIPER pumps offer, let's dive deeper into the benefits this pump technology brings to the table.

No Problem Running Dry:

Let's begin by understanding the pumping principle of an AODD pump.

The main pumping action of the diaphragms inside the pump is a back-and-forth motion within contained liquid chambers, with the use of either flap valves or ball valves in the top and bottom manifolds.

This motion generates little heat and therefore can run dry for extended periods of time without damage to the pump, making it ideal for the mop-up operations of pumping water away from the mine face.

Increased Portability:

With its compact size, no rotating parts, and no need to rely on an electric motor, **SANDPIPER AODD pumps are very portable and do not require electricians or electric cables like ESPs**. In fact, our specialty mining pumps are designed with lightweight materials to make them even more portable.

pH Levels:

AODD pumps are offered in a wide range of materials in both body and internals. AODD pumps from SANDPIPER are offered in either metallic or non-metallic options, both of which are **suitable for all water types, regardless of pH levels**.

Flow Rate:

Because they do not require expensive control equipment, the flow rates of SANDPIPER AODD pumps can be **controlled with the adjustment of air pressure**, making this pump technology **ideal for variable speed requirements in ever-changing mining conditions**.

Versatility:

SANDPIPER® AODD pumps are so versatile that they can be hung on a mine wall, preventing unforeseen external damage from other mining equipment. They can even be submerged in small pits/pools of water, making them very versatile pumps for the mine face.



Conclusion

No matter the pH or type of water at a mine's face, SANDPIPER'S wide range of AODD pumps can provide a solution for your needs. With heavy-duty flap valves and heavy-duty and standard ball valve technologies available, we have the right pump designs to handle your most difficult dewatering applications reliably and safely.

Lightweight and portable, with no need for electricians or heavy equipment specialists, SANDPIPER AODD pumps are the ideal mining face pumps.



The Perfect Pump for Your Mining Needs

Over five decades of innovation have resulted in many class-leading options for each customer's unique application needs. You can trust our wide range of products to satisfy everything from your most basic to most demanding requirements. We're also here to help you select the best pumping equipment to overcome your challenges. We'll ensure you get the right equipment the first time, and we'll be there to support you with expert service and expertise throughout the life of your pump.

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