

# Seal Management Systems for Higher Pressure Applications

The rising cost of water, along with increasing awareness of the long-term consequences of unrestricted water use, has caused many forward-thinking companies to reconsider their traditional, wasteful water use practices.

One solution to eliminate wasting water is the AESSEAL® Water Management System.

In the last decade alone, AESSEAL® have supplied ten's of thousands of water management systems for a wide variety of industrial applications and industrial sectors.

The water management system works by creating a closed loop system which idealizes the mechanical seal environment, resulting in not only water savings compared to a water to drain (Plan 32) system, but increased equipment longevity.

The AESSEAL® water management system is typically connected to the plant water main and is automatically topped up with plant water, to replace the very small amount (about 113 Litres or 30 gallons per year) of barrier water that is lost at the seal faces or through evaporation during normal equipment operation.

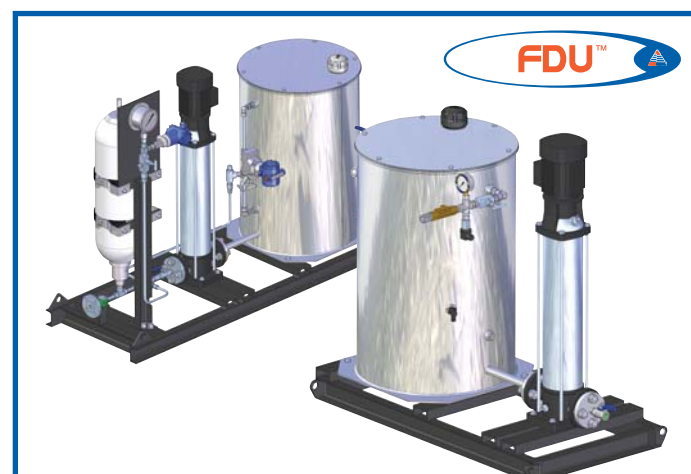
The system is self-managing and maintained at a pre-set pressure that is one bar (15 psi) above the pump's stuffing box pressure. This maintains a positive pressure differential across the seal faces to ensure the fluid film between the counter rotational seal faces is CLEAN and lubricating.

If the barrier fluid pressure is not set higher than the process fluid pressure, the fluid film between the seal faces will be formed from the process liquid, which can be contaminated, abrasive and non-conductive to seal longevity.

Most plants operate a water ring main pressure between 3 and 10 bar (45psi – 145 psi). This is adequate for the vast majority of applications which employ modern process pumps, as the seal chamber pressure in such pumps, is typically lower than 8 bar (115 psi). However, problems with this arrangement can arise where the application, specifically the stuffing box chamber pressure, is operating at a higher pressure than the plant water ring main pressure.

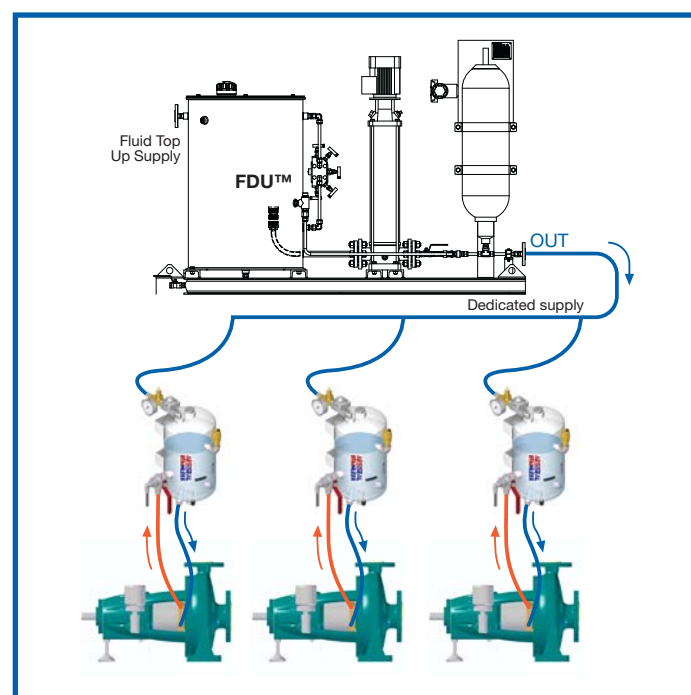
In such cases, the AESSEAL Fluid Distribution Unit (FDU™), as shown in Figure 1, can be employed to address this.

Figure 1 – AESSEAL FDU™



The AESSEAL FDU™ is designed to deliver a reliable and consistent high volume of cooling fluid for mechanical seal and seal support applications. It can also be employed to act as a fluid ring main system, providing cool barrier fluid to multiple independent seal support systems, as shown in Figure 2. This means that the AESSEAL® water management system principle can be applied without the need or constraint of a plant water ring main.

Figure 2 – FDU™ employed to supply multiple seal management systems



The FDU™ ring main system allows the seal management systems to be set at the desired operating parameters for the applications, regardless of differences in equipment operating pressures.

It is available with a number of modular options to suit a wide range of industrial applications where the quality or availability of a closed loop water / oil supply ring main is in question. This system can also be set up as a dead-ended system and run intermittently to save energy costs.

### The advantages of this system include:

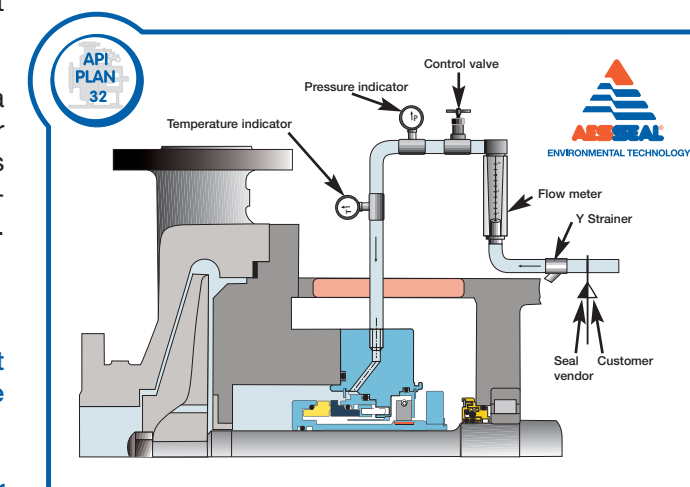
- The operating pressure of the seal management system is not dependant on the available pressure from the plant main water line.
- The FDU™ can supply both water and oil barrier fluid media, extending the application base of the AESSEAL® seal management system into areas where water is not available or permitted to be in contact with the process media.
- The waste cooling fluid is completely eliminated, with huge savings in water resources, the cost of water and the cost of treating waste water.
- Each tank/seal/pump is a stand-alone system; changes in the operating conditions of one pump or the fluid flow to one seal do not affect the fluid flow to the seals of any other pump.
- Changes in the main line pressure, such as turning on a wash-down hose, do not affect the operation or the pressure in the tank systems, as each tank is isolated by its own check valve.

### Additional Savings

In addition to eliminating water-to-drain and increasing the pump seal longevity, there is one more way that AESSEAL® seal management systems can save plants large sums of money, specifically where flushed single mechanical seals are employed.

Figure 3 shows a single mechanical seal in a Plan 32 arrangement, where clean water is used to flush and cool the seal faces. Cold water is injected into the stuffing box and directly into the hot product. As much as 3 million gallons of water per year can be injected into the process liquid by a single pump operating with a Plan 32. In many processes this water must be heated up to the process temperature and ultimately evaporated out of the process liquid, using large amounts of additional energy.

Figure 3 – API Plan 32 with a Single Mechanical Seal



On a typical pulp and paper mill sealing application, with the incoming flush water at 15°C (60°F), and mixing with process fluid at 60°C (140°F), the cost of energy for heating the flush water to process temperature costs £2,600 (\$4,000) per year per seal.

The energy to evaporate this water at the end of the process costs an additional £6,000 (\$9,000) per year per seal. Ironically, this water consumption is not easily visible and so this huge water usage and resulting waste of energy, is often not even recognized by plant operators.

A seal management system, as shown in Figure 2, used with a double mechanical seal to replace the single mechanical seal, eliminates both the wasted water and wasted energy by re-circulating and cooling the barrier water to the seal faces. Huge plant energy efficiencies can be achieved, such as a reduction in the running/operation of the plant Evaporation unit, providing return on the investment of the seal management system in days or weeks.

In today's changing world, AESSEAL® seal management systems are a real environmental saving asset to plants in all industry sectors.