

SJS seawater lift pumps for oil production

Lifting seawater

Sulzer has developed a new vertical seawater lift pump for the oil and gas industry. The special design of the SJS pump meets the requirements of offshore oil production and is a great success in the market. Sulzer has already sold several units that have been installed on oil platforms around the world. The first units have been operating since 2011 in the North Sea with consistently positive feedback from operators.

Seawater is an important fluid in the processes of offshore oil production platforms because it is used in many circuits, such as cooling and reinjection into the well, and it is also used as firewater. For example, in the

injection loop, seawater is pumped up to the platform, where it is then filtered and cleaned. The treated seawater is then injected into the well to increase the pressure there. Sulzer has designed a submersible pump especially for lifting the

seawater. The pump design is based on Sulzer's proven vertical turbine bowl assemblies, which provide reliable and efficient performance.

The SJS pumps utilize a submersible motor to drive the Sulzer vertical pump

In offshore oil production, seawater is used for cooling, for reinjection into the well, and as firewater.



stages. The main benefit of the new design is that the normal vertical lineshaft and bearings are eliminated. This allows the submersible motor and bowl assembly to operate at higher speeds, possibly reducing pump and caisson size. In the standard design, the submersible motor is assembled below the bowl. For applications that require a low net positive suction head (NPSH) and accordingly low submergence, Sulzer can

The new design allows an operation at higher speeds.

also deliver an inverted design, which has the motor mounted above the bowl. The motor is then constructed with a double-wall motor case to guide the flow from the bowl assembly along the motor and into the column pipe.

Motor features and benefits

Finding the best motor was an important step in the development process. Sulzer evaluated many possible motor types from different suppliers and decided to use water-filled submersible motors with hydrodynamic bearings. The water-glycol mixture is much more environmentally friendly than oil, which is also used on some available designs. With this fluid, the cleanliness requirements are less stringent than with dielectric oil. That eases all maintenance and refilling work. For the standard configuration (pump above the motor), the motor is connected through hoses to a simple topside expansion tank. This tank naturally provides an overpressure of the water

The reliable and efficient performance of the SJS pumps has been proven on oil platforms.

inside the submerged motor, allows thermal expansion of the water during operation, and adds the possibility to control any leakage of the system with a simple sight glass and a level switch.

For the inverted design, a pressure accumulator is applied to provide the required overpressure. Furthermore, unlike an oil-filled motor, this water-glycol-filled motor tolerates some sea-

water ingress. It can continue to run for a certain time because the motor stator windings are insulated and do not short circuit as typical oil-filled motor designs would.

Optimized design

The modular Sulzer SJS design with the motor coupled to the pump (rather than impeller mounted on the motor shaft) allows access to motor bearings and

motor mechanical seal without the need to dismantle the pump bowl assembly.

This allows easy maintenance. Further, temperature readings to the windings and the thrust bearings are standard features to provide sufficient operational machine protection.

A variety of materials are available for the SJS pump:

- Cast iron or carbon steel for fresh water
- 316, Duplex, or Super Duplex stainless steels for seawater
- Coated wear part and bushing materials can be selected to meet specified requirements

Successfully field tested

The reliable and efficient performance has been proven on oil platforms during retrofits in the North Sea. They were installed in 2011 as the kickoff of a new development program with the motor supplier. The goal was to harmonize and optimize the design of seawater lift pumps for oil and gas applications. Since the market launch in 2013, Sulzer has

sold several SJS pumps around the world. Presently, units are in produc-

tion in North America, Europe, and in South America. Customers appreciate the simple design of water-filled submersible motors. They like the topside expansion tank in combination with a well-balanced cooling, water-lubricated, hydrodynamic bearing design inside the motor and the possibility of accessing both main modules—pump and motor—separately.



The SJS pump combines Sulzer's proven vertical turbine bowl assembly with supplier's submersible motor technology.

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