

New generation of side channel pumps helps reduce emissions

SERO PUMPSYSTEMS GMBH With the SHP marine side channel pump, SERO Pumpsystems GmbH has launched a new means of injecting LPG from various supply tanks into the drive engines in the secondary fuel supply systems of hybrid ship propulsion units



BW Gemini is the world's first two-stroke, LPG-powered vessel to be converted for BW LPG

Being a liquefied gas that is stored in unpressurised and chilled tanks, LPG requires specifically designed pump equipment to boost the pressure to approximately 55 bar within the secondary fuel supply system (SFSS). Originally, developed for oil and natural gas applications, the "standard" SHP side channel pump covers many of the hydraulic requirements.

However, to meet shipboard service conditions, various marine adaptations

were made to the basic design. The aim was to fulfil the relevant technical regulations of international classification societies that were based on the IMO-IGC set of rules and standards.

The success of these measures has been confirmed by approval from DNV. This makes the SHPmarine the first pump of its kind to have a type approval for maritime dual-fuel propulsion systems. This designation allows the SHPmarine to be incorporated into the designs of various manu-

facturers of marine propulsion engines and large marine diesel drives.

The SHP side channel pump was originally developed to pump clean (solid-free) light hydrocarbons, petrochemical liquids and any volatile process fluid with an entrained gas content of up to 20% by volume. Natural gas liquid (NGL) and LPG transfer and boosting are common services.

The target applications in the oil and gas processing industry nicely overlap the essential pumping requirements of the SFSS marine services. The hydraulic capabilities of the SHP cover the essential SFSS pumping criteria closely, but the design functionality of the SHP allowed for marine adaptation.

The most important point is the fact that side channel pumps can handle difficult conditions like no other pump technology. In extreme cases, the SHP can reach a head of almost 1,200m at a flow rate of 1m³/h. The fuel consumption of a typical LPG tanker is between 3,000 and 5,000 litres of propane per hour depending on its size and maximum attainable speed.

The SHP is required to feed the SFSS consistently and, in turn, the main propulsion engine at this rate and with a pressure head of approximately 1,100m. Usually two SHPmarine pumps are employed and work in conjunction with an intermediate service tank in the SFSS. This allows pressure and LPG temperature to be controlled according to consumption.

One of the key advantages of the SHPmarine is its low net positive suction head (NPSH) requirement. This is of great importance when extracting LPG from the upper deck gas tanks. Where space is extremely limited, the low NPSH requirement of the SHP allows the tanks to be lowered and configured to feed the pumps efficiently.

Another feature of a side channel pump is that it is pulsation free thanks to its unique delivery principle. Unlike piston diaphragm

Source: BW LPG



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Source: SERO PumpSystems

pumps, side channel pumps do not cause any pressure fluctuations or impulses.

They operate continuously and provide consistent flow at the prescribed discharge pressure. Pulsation dampers are not required. In addition, the SHPmarine, for its part, is resistant to the vibrations from the ship's main drive engines that can be transmitted through the hull of the vessel.

Marine adaptation and acceptance according to IMO-IGC regulations

In terms of process technology, the SHPmarine side channel pump meets all requirements for the pumping of LPG from the storage tanks via the SFSS to the propulsion engine of an oceangoing vessel. Shipboard applications are, however, harsh and challenging due to the unique ambient conditions in which ocean going vessels operate.

The SHPmarine has been adapted to conform to the established IMO-IGC rules and guidelines. The material requirements for pressure-containing components includes the use of austenitic stainless steels or low-temperature nickel steel.

Additionally, the corrosive environment and the extreme temperature swings had to be taken into account. This was achieved by using spring-loaded stainless steel hardware and special low-temperature O-rings along with a five-layer marine paint to protect the structural components from salt water and UV radiation.

A special dry-running mechanical seal was designed to meet emission standards and ensure safety with leak-free performance. The cartridge seal provides the highest cost efficiency in operation and service.

To meet the flow and head criteria, SERO PumpSystems has extended SHPmarine's performance range up to a ten-stage hydraulic configuration. To assist in servicing the pump, the company integrated an all-steel spacer coupling between the pump and the drive engine.

Modular design

The SHPmarine incorporates a modular design for the liquid end of the unit. The pump can be supplied with a variable number of stages to adapt it to the specific flow rate and delivery head required on

the ship. The modular design using "standard" components guarantees cost-effective and efficient production of the pump, but ensures short and reliable delivery times.

Currently, the first SHPmarine pumps in both the high-pressure and the low-pressure versions have already been integrated into the SFSS of various LPG tankers. Commissioning will commence shortly.

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SERO is the only exclusive manufacturer of side channel pumps. Environmental protection and conservation of natural resources are corporate responsibilities which are top priorities in the company's ESG strategy.

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